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## THE STUDY OF THE BASE OF THE SKULL

WITH SPECIAL REFERENCE TO DEEP PERISINUSITIS—TECHNIC AND SPECIAL  
TABLE ATTACHMENT<sup>1</sup>

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THE study of the base of the skull is certainly one of the most important elements in the investigation of intracranial disease and disease of the nasal accessory sinuses. I will make no attempt to review the enormous amount of literature bearing upon the roentgenographic studies of the skull and cranial cavity; and I will only refer to some of the more recent developments in technic, not even including the excellent work with lipiodol, but will confine myself especially to the general technic and the special information obtained from a study of the base of the skull. We must all realize that the recent work has been made possible only by the brilliant work of the authors who have preceded.

My interest in the study of the accessory sinuses has extended over a period of twenty-five years, but Coakley and Caldwell were probably the first in this country to investigate the subject systematically, and Caldwell was the first to describe his technic, at the Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, 1906. In discussing Dr. Caldwell's paper, I

called attention to the importance of studying the accessory sinuses at various angles.

Most roentgenologists who have taken special interest in the study of the nasal accessory sinuses must have recognized the changes which occur in the surrounding bony walls, but the importance of these pathological changes has been especially emphasized in the writings of Van Zwaluwenburg, Law, and Granger, as well as myself. Many of us think these changes are of more importance than the involvement of the mucous membrane.

The early works in roentgen diagnosis of accessory sinus disease referred especially to the opacities in the cavities caused by exudate. In this respect we supplement and confirm the findings of the clinicians by their means of transillumination, but the roentgenologist who recognizes only the opacities misses much valuable evidence. Van Zwaluwenburg said: "We depend for our interpretation on the changes in the bony structures more than on the hazy opacities that are caused by the exudates and the soft tissue changes in the diseased pneumatic cells." Granger called attention especially to the changes in the bones forming the roof of the

<sup>1</sup>Presented at the Fifteenth Annual Meeting of the Radiological Society of North America, at Toronto, Ontario, Canada, December 2-6, 1929.

sphenoid sinuses, and Law emphasized the importance of the changes in the walls of the ethmoid cells.

scopic films in the sagittal plane shift, as has been recommended by Van Zwaluwenburg and Grier.

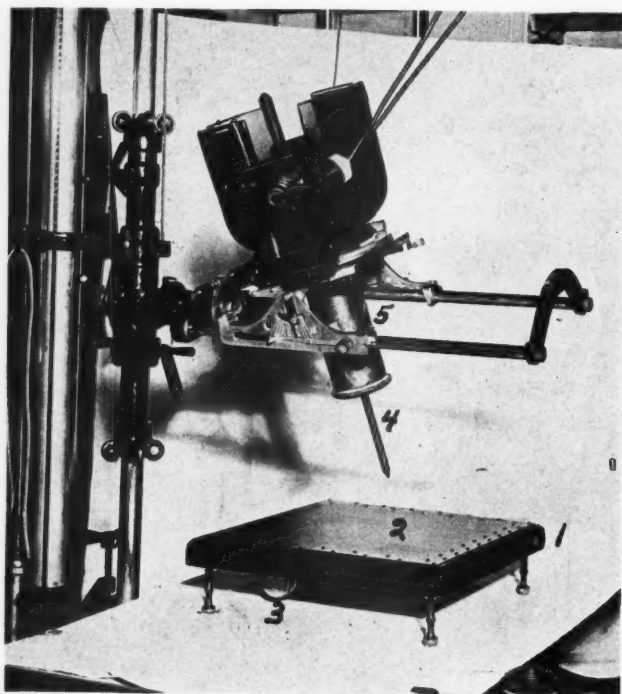


Fig. 1. Head rest and localizer. (1) Head rest. (2) Celluloid top. (3) Dry battery for small lamp. (4) Indicator of central ray. (5) Localizing cylinder.

#### TECHNIC FOR EXAMINATION OF ACCESSORY SINUSES

For the study of any of these changes in the bony structure of the walls, it is absolutely essential to have perfect roentgenograms, which show the finest detail. A fine focus tube, the smallest possible diaphragm that will include the sinuses and no more; absolute stillness of the patient and the tube will be important factors. A localizer such as I show in Figures 1 and 2 will assist in absolute direction of the central ray in relation to the accessory sinuses, and will permit the use of the smallest diaphragm. It is now helpful and almost essential to make stereo-

Indifferent technic in sinus work practically nullifies its value. The sagittal plane must be absolutely perpendicular to the plane of the film. Slight rotation even though the films are made stereoscopically makes the interpretation difficult. The "head leveler" (Figs. 3, 4, 5), which I described in 1916, will be helpful for this purpose. This instrument is especially useful with women whose hair makes it difficult to definitely level the skull.

At present, in my studies of the accessory sinuses, it is my routine to make three stereoscopic films anteriorly with the shift in the sagittal plane, and with the central ray in the two shifts coming to the same point with a

target-film distance of 22 inches (Fig. 6). I then make a lateral film at a target-film distance of 37 inches (which permits a

rest and localizer. This is a head rest 3 inches high, with a celluloid top (Fig. 1) on which is marked a central line to corre-

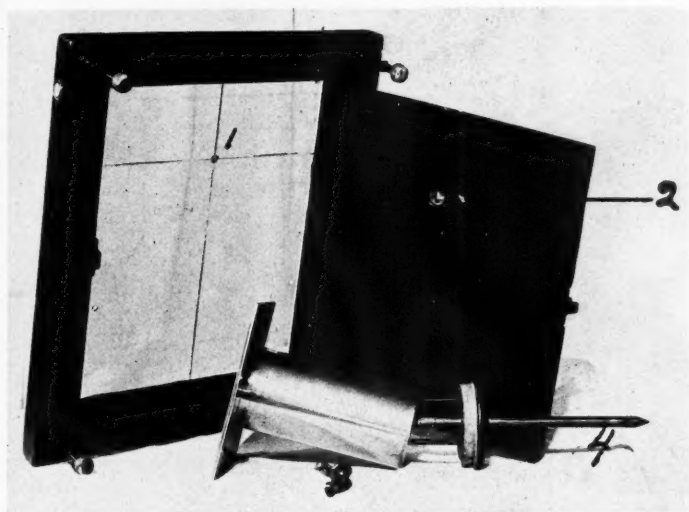


Fig. 2. (1) Cross lines on celluloid top and central point toward which the central ray is directed in making stereoscopic examinations of the accessory sinuses or the mastoids. (2) Small electric lamp to light the focal point from the lid which supports the film cassette. (3) Localizing cylinder. (4) Indicator for central ray, which is removable.

smaller diaphragm and gives better perspective values than does a film made at closer range), and then a film of the base of the skull. The three stereoscopic exposures and the lateral view are each made on one-half of an  $8 \times 10$  inch film, and the base of the skull film is also an  $8 \times 10$ , making three  $8 \times 10$  inch films. When the conditions demand it, I make also oblique films of the maxillary sinuses, or oblique films of the sphenoid region, or special films of the frontal and maxillary sinuses according to Waters' technic. All of these special studies are essential in some cases and probably would be useful in all, but the five routine exposures above described will usually give the necessary information and do not involve an excess of work or undue exposure to the patient, or unnecessary expense.

In making the stereoscopic films as indicated above, I make use of my special head

spond with the median sagittal plane of the skull. Half of this celluloid top is covered with a heavy brass plate, so as to divide an  $8 \times 10$  inch film in half; the other half is used for the exposure. At right-angles to the longitudinal line there is a transverse line dividing the half into quarters. At a point  $2\frac{1}{2}$  inches from the median line on the right is placed a lead letter "R," and on the left an "L." These two letters mark on the film the right and left side of the face, and also serve as fixed points for cutting and for focusing the stereoscopic image. The entire field on the film covers about 6 inches. There is a small electric lamp immediately below the point at which the two lines intersect, energized from a small battery, which may be used to throw light on the position of the patient in relation to the above mentioned lines, and is useful for definitely localizing the patient for either sinus or mas-

toid examinations. The tube is so arranged in advance that the central ray will always be directed to this point in each position for the stereoscopic images.

whole procedure takes very much less time than it does to tell of it. The patient's head is held in position by heavy sand bags. The first exposure is made with the central ray

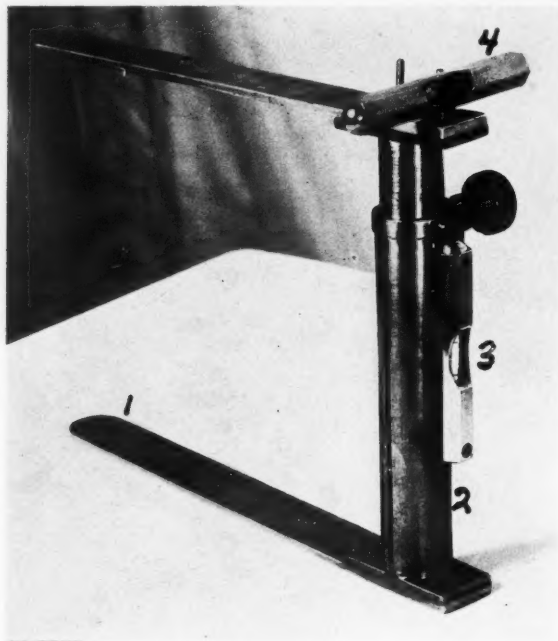


Fig. 3. Head leveler. (1) Arm which fits into the external auditory canal. A knob should be attached to fit the ear. (2) Adjustable cylinder to make it fit any size of head. (3) Leveler at right-angle to the sagittal plane. (4) Leveler for bringing the sagittal plane parallel with the film. This can be rotated.

For use, the patient is placed in the prone position with the arms folded in front of the head rest under the chest, and with the sagittal plane over the longitudinal line. The lower border of the orbit is brought over the transverse line and one can check these by the reflecting light. With the film in place the central ray is directed to this point of junction of the above lines on each exposure, with the stereoscopic shift in the sagittal plane, for the three postero-anterior views. This set-up and the angles are all determined before putting the patient in position. The

at an angle of  $20^\circ$  to the perpendicular and shows especially the frontal sinuses, projecting the base of the skull below the orbits. The second exposure is made at  $10^\circ$  with the perpendicular and shows especially the sphenoid and ethmoid cells, and projects the shadow of the base of the skull into the orbits. The third exposure is made with the central ray perpendicular to the plane of the film, and shows especially the maxillary sinuses with no overlying bony shadows except those of the cervical spine (Fig. 12).

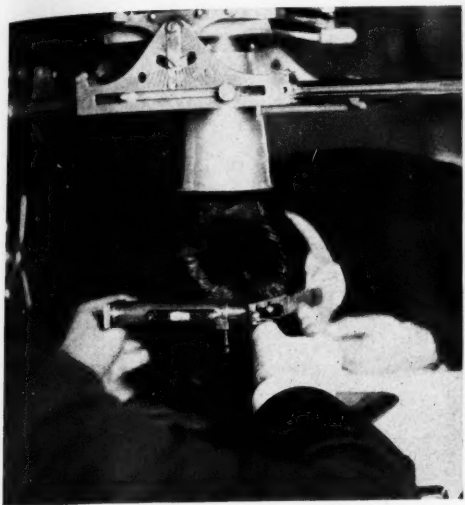


Fig. 4. Shows the leveler in use for the postero-anterior view.

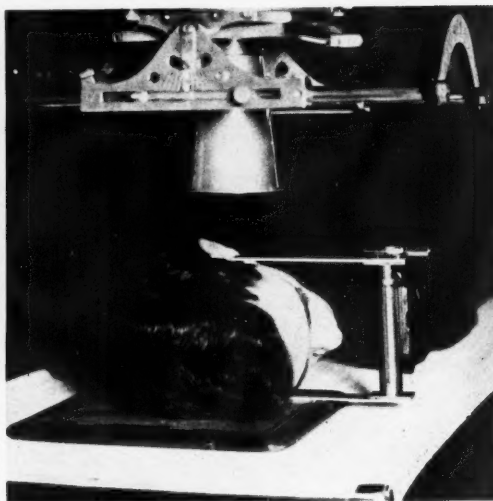


Fig. 5. Shows the leveler in use for the lateral view.

#### TECHNIC FOR DEMONSTRATION OF THE BASE OF THE SKULL AND SPECIAL APPARATUS

We have attached a wooden shelf  $7\frac{1}{8} \times 15\frac{1}{2} \times 20$  inches, supported by a brace at one end of our roentgenographic table, at a point 7 inches below the level of the top, and standing upward  $20^\circ$  from the horizontal (Fig. 7). Upon this is placed a flat  $11 \times 14$  inch Potter-Bucky diaphragm, which brings the upper surface 4 inches below the level of the top, and, of course, at the same  $20^\circ$  angle with the horizontal or level of the top of the table (Fig. 8).

For the exposure the tube is placed so that the central ray will be at an  $80^\circ$  angle to the plane of and at the center of the Potter-Bucky diaphragm, over the center of an  $8 \times 10$  inch film between double intensifying screens, and at a target-film distance of 30 inches. All of these preparations are made in advance so as not to keep the patient in this trying position longer than is absolutely necessary. Once the upright tube holder, which is attached to the table, is set, the tube can be elevated so as to give plenty of room to the patient and then quickly returned to

its required position. A pillow about three inches thick (when compressed) is placed at the end of the table and the patient's head is allowed to hang over the end of the table so as to bring the top of the head in contact with the flat Potter-Bucky diaphragm and with the base of the skull in a plane parallel with the film. The head is held in place by a ring pad placed over the chin, over which is stretched the compression band.

For the exposure we use approximately 1 minute, 10 ma., 70 to 80 K.V., at 30-inch target-film distance, with the 2 mm. glass filter, using an oval cone  $3\frac{1}{2} \times 2\frac{1}{2}$  inches, which just covers, and an  $8 \times 10$  inch film at 30-inch distance. Of course, we use the Potter-Bucky diaphragm. The patient needs to be in this awkward position only about two minutes, and, so far, we have not found any sinus patient who could not assume this position. A very nervous patient, or one with an injured, rigid, or painful neck would probably not be able to assume this position.

When desirable, the posterior part of the base of the skull can be further studied by having the patient lie prone and bend the

head forward so as to bring the base of the skull parallel with the plane of the film. In this latter position one avoids the shadow of

year 1924. He was at once impressed with the fact that it was probably more important than the involvement of the mucous

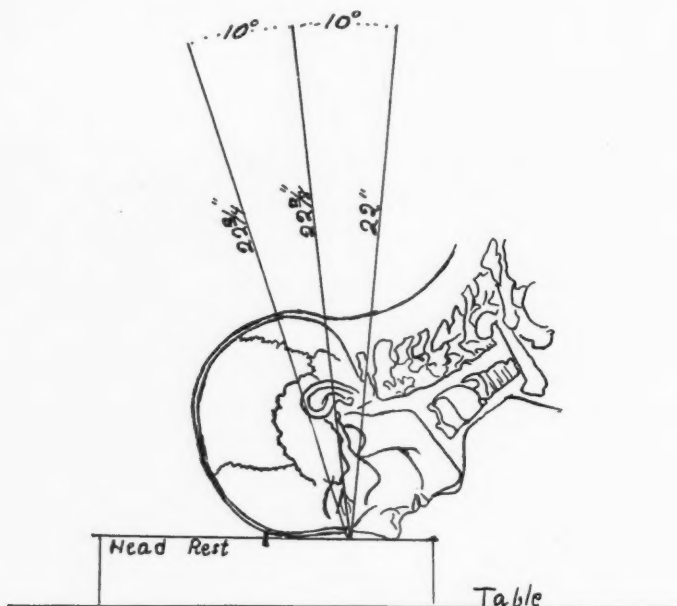


Fig. 6. Diagram of the position of the head on the head rest with the two stereoscopic shifts centering at the same point.

the cervical spine, which is always demonstrable in the occipital region in the first position.

#### IMPORTANCE OF THE STUDY OF THE BASE OF THE SKULL

I believe there is no single view of the skull that will give as much important information as that of the base of the skull, but I think it should form only a part of a general examination of the skull and should be a routine part of the study of the nasal accessory sinuses.

The involvement of the base of the skull from an extension of infection from the ethmoid and sphenoid sinuses was first observed and described from a roentgenological standpoint by Hirtz, in his work during the

membrane. I also made a report upon this subject before the section on Otolaryngology of the American Medical Association in June, 1928. Babbitt, in a very excellent clinical paper, has expressed the belief that further X-ray studies of the base of the skull may demonstrate the cause of many obscure neuralgias.

Logan, Turner, and Reynolds have studied in twenty autopsies the paths of infection to the brain after primary involvement of frontal, ethmoid, or sphenoid sinuses—five, six, and nine cases, respectively. They went so far as to demonstrate, in one case of direct extension by microscopic necrosis, a constructed continuity of lymph vascular connections between the two layers of cranial bone, with processes of the deep layer of the mucus passing into the bone. They dem-

onstrated the following paths: (1) through sphenoid sinuses. The frontal sinuses are necrosing osteomyelitis; (2) through throm- rarely shown, and, when shown, are nearly bophlebitis of perforating veins; (3) obliterated by over-exposure. From front

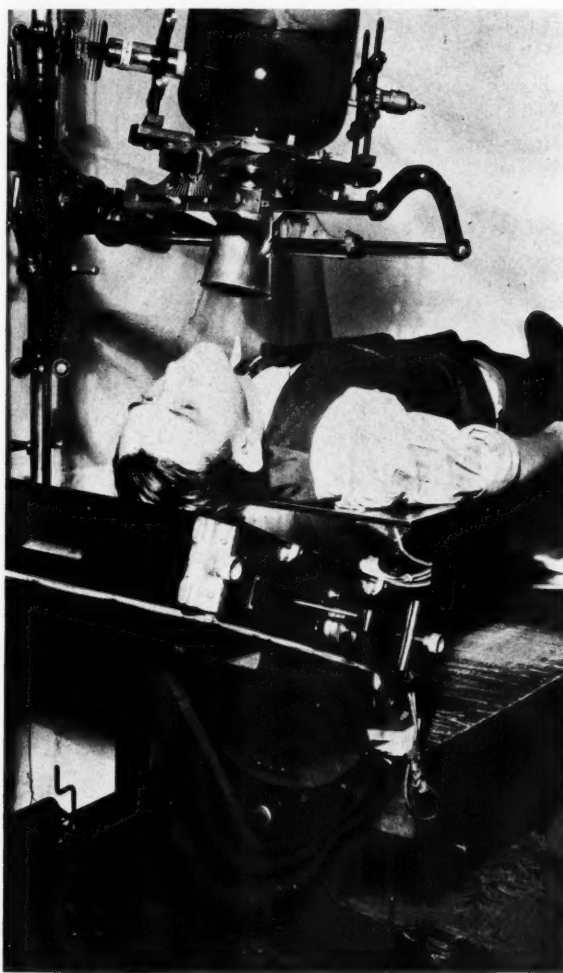


Fig. 7. Special table attachment, showing position of the patient, except that the pillow under the patient has been omitted while making the photograph, and the chin is not extended enough.

through Haversian spaces in sinus walls; (4) along perineural lymph sheaths of olfactory filament.

The normal skull and sinuses will show anteriorly the alveolar process, the teeth and the mandible forming the anterior and lateral borders of the ethmoid, maxillary, and

to rear one recognizes the ethmoid cells divided by the nasal septum, then the sphenoid sinuses, the basilar plate, the anterior arch of the atlas, the odontoid process of the axis, the foramen magnum, and the occiput. On each side from front to rear, in the same order, one recognizes the middle and the

posterior fossæ of the skull, separated by the petrous portions of the temporal bone and the mastoid processes. Normally, the lines and the cancellous structures are sharply defined; the bone is evenly and symmet-

#### ROENTGENOLOGIC SIGNS OF DEEP PERISINUSITIS

The changes incident to chronic ethmoid-sphenoid sinusitis consist of a cloudiness,

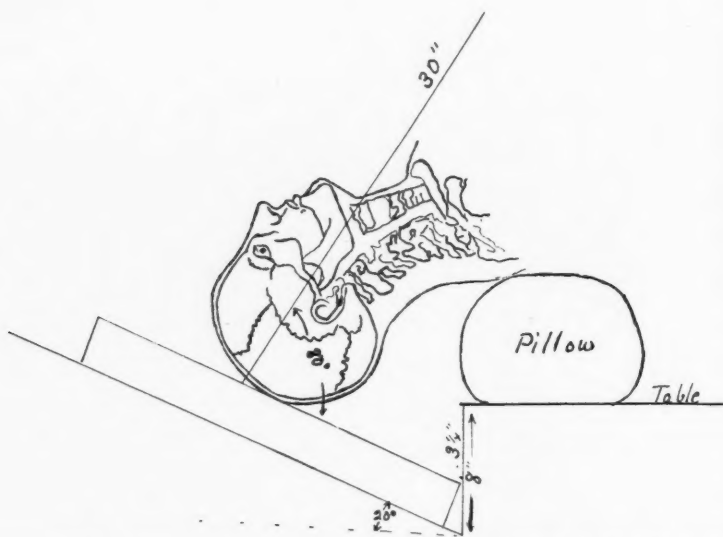


Fig. 8. Diagram of position and angles for examination of the base of the skull.

rically dense. The air-containing cavities show a symmetrical transparency and a general appearance of health.

The roentgenologic signs of acute superficial sinusitis are a cloudiness of the affected cavity. The walls show a decreased thickening, and at the same time an indistinctness or haziness in the acute stage. This indistinctness in and about the wall or at the borders is variable in extent, but in the films made especially of the frontal region when these sinuses are involved it can be recognized at times for more than one centimeter beyond the sinuses. At a later stage, this border on the outside of the sinus becomes denser than the surrounding bone, owing to an increase in lime deposit—the defense reaction in bone—and indicates an osteitis or perisinusitis.

with a vague shading off of the anatomic details, accompanied frequently by a thickening of the posterior and lateral wall of increased density, which indicates an osteitis in the surrounding bone. This areola of dense bone corresponds in every detail to the perisinusitis in the frontal region previously described. This condition is not shown, except in association with sinusitis affecting the ethmoid or sphenoid sinuses. Therefore, Hirtz and Worms have named this condition "perisinusite profonde."

This perisinusitis commonly extends into the middle fossa of the skull, but it may extend into the petrous and mastoid portions of the temporal bones, and even into the posterior fossa. At times, this deep perisinusitis is general and involves the base of the skull; at other times, it is confined to

one side, but it always corresponds to the side in which there is a deep sinusitis. Therefore, it must be concluded that it is an

inflammation from sinusitis may also be recognized in the anterior fossa by means of the oblique frontal-plate position (Waters'

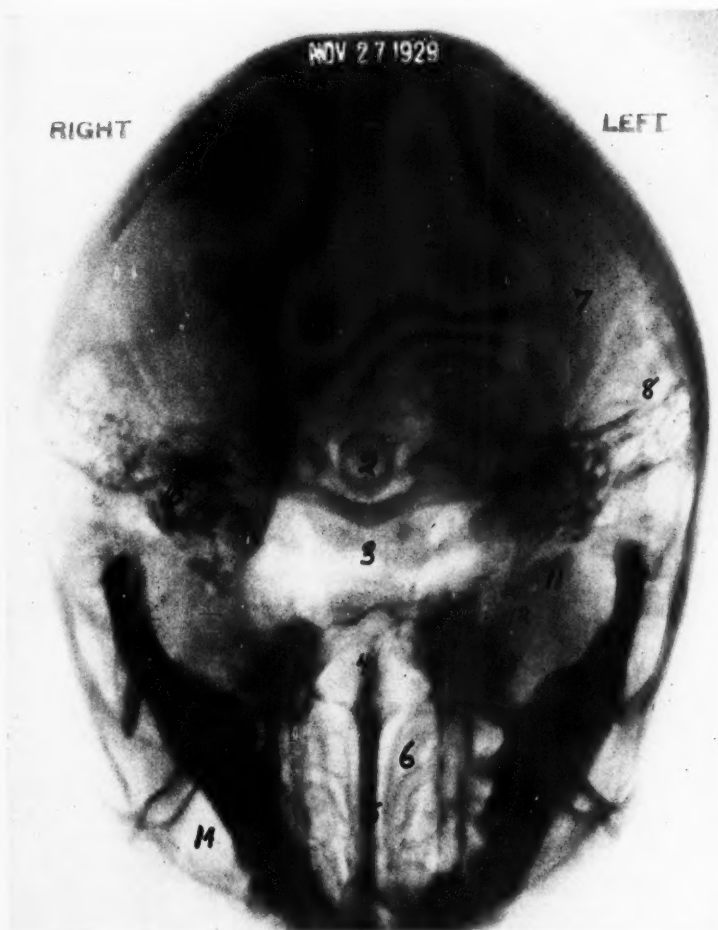


Fig. 9. Normal base of skull. Mrs. H. A. J., referred by Dr. W. Zentmayer, March 27, 1928. Normal film of the base of the skull. The anatomic details in the median line from above downward should be noted: (1) foramen magnum, with a ring of the odontoid process; (2) the axis; (3) transparent area caused by the pharynx; (4) transparent area of the sphenoid sinuses; (5) the nasal septum, and on each side of the septum are (6) the ethmoid cells. Lateral to this from above downward are: (7) the occipital bone and posterior fossa; (8) the mastoid cells; (9) the petrous portion of the temporal bone; (10) the groove of the internal carotid artery, leading into the cavernous groove; (11) the foramen spinosum; (12) foramen ovale; (13) foramen rotundum; (14) maxillary sinus, and (15) the teeth. All of the bony tissue is uniform in density and normal in structure.

extension of the inflammation directly from the affected sinus. This extension of the position) and at times in the lateral position. This demonstration of the extension of the

inflammation to the bones forming the base of the skull would lead one to assume that the dura mater, which takes the place of the periosteum on the inside of the skull,

The alterations noted so often may be divided into two classes: (1) Those which affect the sella turcica and (2) those which affect the adjacent structures.



Fig. 10. Base of skull in the posterior portion, made with the head hanging forward, and with the patient lying prone.

also becomes affected, as is indicated by the case reported subsequently in which the patient died from meningitis (Figs. 11 and 12).

As a result of an extension of this inflammatory process, one can assume indirectly an effect on the sella turcica, which may account for the anomalies which have been observed for many years, but which radiologists have been unable to explain. These changes about the sella consist of a calcification of the bridge of ligaments connecting the anterior and posterior clinoid processes, the formation of osteophytes about the posterior clinoid processes, hypertrophied tips of the clinoid processes, calcification of bands extending from the posterior clinoid processes backward, or flocculent lime deposits posterior to the clinoid processes.



Fig. 11. Base of skull showing osteitis from extension of perisinusitis (*Archives of Otolaryngology*, December, 1928, VIII, 638-646). Mrs. H. E. B., referred by Dr. William Whelan, January 5, 1928. In addition to the details described in Figure 12, the area of increased density in the left middle fossa should be noted, and, to a lesser extent, the anterior portion of the right middle fossa. These lesions in the left middle fossa are probably the result of the chronic inflammatory process. Note the absence of the lines of the septa in the right ethmoid region. This indicates an acute process. Operation showed pus in the region of the right ethmoid sinus.

In the first class the clinoid processes are affected. The anterior processes are less frequently changed, and at times they are only elongated without being thickened, while the posterior clinoid processes usually show periostoses or hyperostoses. Bridging processes may at times be observed between these processes. The posterior clinoid process may be distinctly clubbed.

The anomalies in the retrosellar region



Fig. 12. Same case as shown in Figure 11. *X-ray observations:* The frontal sinuses were large and clear. The sphenoid sinuses were clear. The ethmoid cells were extensively diseased, especially on the right side, and the right maxillary sinus was opaque. There was shown, especially in the base of the skull, an osteitis surrounding a small cell region, to the right of the sphenoid, and a larger one to the left of the sphenoid in the middle fossa of the skull. The latter was probably an osteitis extending backward from a former disease of the ethmoid. In the accompanying figure, I have indicated with small arrows this area of increased density which indicates an increased lime deposit resulting from an old chronic inflammation. This, of course, does not show that the process was active.

are: (1) Bands of variable length, having the aspects of rather dense, evidently calcified, ligaments, which represent the pos-

Hirtz studied a series of 144 cases with reference to the calcification of the pineal gland, and found calcification in 77 (56 per



Fig. 13. Showing destructive effect of a brain tumor in the region of the left gasserian ganglion, causing a trifacial neuralgia, undiagnosed even by expert X-ray examinations until this film was made. Confirmed at operation by Dr. F. Grant. Temporary relief, recurrence, and death.

terior petroclinoid ligaments and which probably indicate that there has been a local chronic meningitis, and (2) flocculent lime deposits lying posterior to the sella, which probably indicate deposits in the walls of the vessels.

cent), but in none did he find this calcification unless there was associated evidence of deep perisinusitis. He stated that calcification is not due to old age.

Schüller has expressed the belief that the calcification of the bands extending from the

clinoid processes are merely modifications of the normal, and that they are not of any clinical importance, but he admits that inflammatory processes may extend from the sphenoid sinus to the sella. With definite evidence of osteitis in the surrounding portions of the base of the skull, the assumption of a similar extension to the sella would seem justifiable.

I have found these studies of value in determining the cause of obscure neuralgias, headaches, and ocular disturbances. The time allotted will not permit a detailed clinical review but I shall demonstrate to you, if time permits, about 35 lantern slides showing these changes and at some future time I may be able to arrange a film exhibit to demonstrate this technic and these pathological changes.

Other pathological conditions should also be demonstrated by this study of the base of the skull, because of the ability to compare both sides. They are:

1. A brain tumor (Fig. 13) may show a pressure erosion or invasion, which, by its destructive process, decreases the density of the affected bone. If a brain tumor contains lime deposit, it will be demonstrable by comparison with the opposite side, and when considered in association with its clinical symptoms will give an exact location.

2. Fractures of the base of the skull should be demonstrated in this position if the patient's condition will permit such an examination.

3. Anomalous conditions and congenital defects can be well demonstrated.

4. There is so much variation, especially in the floor-plan of the sphenoid sinuses, that it would seem desirable to have this demonstrated in any study involving the cranial cavity or the accessory sinuses. Since I have developed this technic, I have used my special mouth cassette less and less.

5. It is of value in demonstrating extension of malignant disease from the nose, throat, or accessory sinuses.

6. For the demonstration of these changes, perfect roentgenograms are essential, which can be produced by the technic which I have described.

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## DISCUSSION

DR. PFAHLER (closing): I appreciate Dr. Sosman's discussion. I have been carrying this work on for years. I simply move the flat Potter-Bucky onto the table, and, with the two little holes drilled in it, I can lift it up to the position described by Dr. Sosman. But also in my paper and in the films which I have in my collection, I have shown erosion of the brain tumors onto the base of the skull. Then we can also have the patient lie prone, as I have described and have some slides showing, and, by having the rays from behind, you can get a little more of the base of the skull—bones of the mastoids and the whole of the base of the skull. But in that case the spine drops over the front of the ethmoid region, and you blot out the ethmoid. In these two positions you can get practically complete outline and clear details concerning the base of the skull.

## THE MODIFICATION OF THE BIOLOGICAL REACTION OF LIVING TISSUE TO X-RADIATION BY PHYSICAL AND CHEMICAL AGENTS<sup>1</sup>

By JOHN R. CARTY, M.D., Cornell University Medical College, NEW YORK CITY

EWING (1) and others have emphasized the factor of radiosensitivity of the malignant cell in the therapeutic use of X-rays and radium. Without confusing sensitivity with clinical cure (2) many radiotherapists are now in agreement that cellular sensitivity represents an important element in the results obtained (3). If, then, our success depends to a large extent on relative cellular sensitivity, why cannot we alter or prepare the malignant tissue to react more vigorously and favorably to X-radiation and at the same time make the normal surrounding tissue less vulnerable?

Jolly (4, 5) says: "The radiosensitivity of a cell depends not only on the type of cell but on the particular physiological condition of the cell at the time of radiation. This permits the hope that one can not only diminish the sensibility of the cell but increase it." As the first step in the approach to this problem we should consider by what means the biological reaction of normal tissue to X-radiation can be altered. It is the purpose of the writer to review the work accomplished in this field, with special emphasis on the experimental evidence. The problem will be considered from a local rather than a systemic aspect.

In reviewing the literature one is impressed by the comparatively small amount of careful experimental work. As an example, in Warren's (4) review of significant work done regarding the physiological changes produced by X-radiation, he includes only three articles dealing specifically with artificial tissue sensitization out of a total of 165. There has been some clinical application, but often the cases are too few

to permit one to draw conclusions and the results are confusing.

We will discuss the subject of artificial sensitization and desensitization under the following heads: (1) Effect of vascular changes; (2) thermal changes; (3) use of metals as secondary radiators; (4) the use of irritating and toxic substances; (5) the effect of ultra-violet radiation; (6) the effect of direct and high frequency electric currents.

### VASCULAR CHANGES

Jolly (5) ligated the afferent blood supply to an inguinal node in a rabbit. Histological studies made soon after radiating with X-rays showed much less evidence of reaction than in the control. Holthusen (6) raised the objection that the studies were made too soon after irradiating and thought that the reaction was only delayed and not diminished.

Ferroux and Regaud (7) undertook similar work, temporarily ligating the testicle of the rabbit. Histological studies made as late as four months post-radiation showed a diminution of the reaction.

Ferroux (8) temporarily occluded the circulation to the rabbit's ovary during exposure to X-radiation and thus diminished the reaction.

Wynen (9) occluded the venous return flow in a dog's leg. After radiating both legs, the side having the venous return blocked showed the less marked reaction.

Jolly (10) infiltrated an inguinal node and surrounding tissue of a rabbit with adrenalin and then irradiated with aluminum-filtrated X-rays. The control showed gross and marked histological changes,

<sup>1</sup>Read before the Radiological Society of North America, at the Fifteenth Annual Meeting, at Toronto, Dec. 2-6, 1929.

while the infiltrated node showed only occasional histological changes.

Wynen (9) produced a hyperemia with diathermy and increased the sensitivity of the human skin by from 30 to 40 per cent.

From this experimental data we can conclude that ischemia and passive hyperemia will decrease the sensitivity, while active hyperemia will increase it.

#### THE EFFECT OF THERMAL CHANGES

Experienced roentgenologists have long held the opinion that the temperature of an irradiated part is an important factor in the resulting reaction. G. W. Holmes (11) says, in discussion, "I have not the slightest doubt that the high temperature of the skin of goiter cases makes them unusually sensitive to radiation."

Kaestle (12) and Janus (13) found that after heavy treatment an erythema could be provoked by hot applications or hot baths. Bovie (14) radiated paramacia with a hydrogen discharge tube and found that a certain dose of fluorite rays would produce no ill effects if the temperature was 17 to 18 degrees C., but most of the organisms died when the temperature was raised to from 24 to 28 degrees C. soon after irradiation.

Hawkins and Clark (15) exposed the skin of guinea pigs to heat sufficient to cause a slight burn in one-half the animals, this burn usually healing in from ten to fourteen days without leaving a scar. Afterwards the animals were exposed to the same heat plus a sub-erythema dose of X-radiation at the same time. Extensive ulcers formed which took from thirty-five to forty days to heal, leaving a thick scar which resembled that seen following a heavy overdose of X-rays.

The same observers (16) exposed different skin areas of the guinea pigs to sub-erythema doses of soft X-rays followed by heat of an intensity below the critical dose for the production of a burn, and to both radiations in sequence. The areas exposed

to heat and X-radiation in sequence developed well marked and persistent lesions. The results were the same regardless of the order of application.

Dognon (17, 18) has studied the effect of heat extensively, using *Ascaris* eggs as biological material. He has concluded that the sensitivity to X-rays varies greatly with the temperature, increasing as the temperature increases, and states that "it is very probable that it is a general law which could be utilized in radiotherapy."

Martin and Caldwell (11), in some interesting experiments, applied cold for long periods of time over irradiated skin areas in rabbits. The biological effect was considerably augmented. They found that placing adhesive plaster over the irradiated area would produce the same reaction to the X-rays as the cold application. It was stated in the ensuing discussion that cooling lotions and ice bags applied for short intervals would apparently diminish the reaction.

Rohdenburg and Prime (19) found that virulent rat tumors could be destroyed by a certain degree of heat or a definite dose of X-rays. They obtained the same result by combining the sub-lethal degree of heat and X-rays, and found that the heat could be applied either before or after radiation. Halberstädter and Simons (29), using human skin, increased the reaction markedly by hot applications.

There is little doubt but that increasing the temperature of a part has a toxic effect upon the cells, increasing the sensitivity.

#### THE USE OF METALS AS SECONDARY RADIATORS

Since Barkla (21) first advanced the idea, the use of heavy metals as radiators to enhance the effect of the radiation has received attention. The methods employed fall into three general groups: (1) The introduction of metal objects such as needles.

thread, etc., into the growth; (2) the introduction of colloidal suspensions of heavy metals; (3) the use of substances showing a specific affinity for malignant cells and capable of increasing the secondary radiation.

Ghilarducci (22) placed bismuth carbonate in a rabbit's stomach and thought that the radiation effect was enhanced.

Gauss and Lembke (23) irradiated tadpoles in colloidal suspension of heavy metals. They noted a greater effect upon those irradiated than upon the controls placed in distilled water.

It has been shown that the "radiators" themselves act as screens for the scattered radiation, thus actually diminishing the intensity, but as has been pointed out by Sams-sonow (24), all the physical and biological factors were not considered.

Wood (20) tried the effect of combining colloids of heavy metals with radiation on experimental tumors, and found that colloidal lead had a beneficial effect although others did not.

Metal objects involve mechanical injury to the tissue which is undesirable. It is said that massive necrosis is apt to follow. The introduction of colloidal suspension seems somewhat more logical as better distribution can be assured and there is probably less screening of the scattered radiation.

The third method of using a substance having an elective affinity (25) for the malignant cell and at the same time capable of enhancing the secondary radiation is attractive.

#### EFFECT OF IRRITATING CHEMICALS

Irritating chemicals are apt to cause severe reactions when applied to an irradiated skin area, as MacKee (26) has frequently stated. The use of such substances as mustard oil (45) and croton oil as sensitizing agents has been proposed. Tincture of io-

dine, chrysarobin, and salicylic acid are particularly prone to enhance the X-ray effect. Occasionally even the mildly irritating substance will give rise to severe reactions (42).

Haxthausen (27) rubbed croton oil over two skin areas, the first having been previously radiated with medium wave aluminum-filtered radiation, the other serving as control. The resulting reaction was more marked over the irradiated area, although there previously had been only very occasional visible X-ray changes.

Schneider (28) found that irradiated *Paramecia* were more readily killed in an alkaline electrolyte. Halberstädter and Simons (29) found that by rubbing ammonia over the human skin they could greatly increase the resulting reaction.

The lack of control as to duration of action and intensity would probably preclude the general use of irritants as sensitizers. They would be difficult or impossible to apply to inaccessible regions of the body.

#### THE EFFECT OF ULTRA-VIOLET RADIATION

In 1909, Becker (30) was probably the first to state that previous tanning by ultra-violet radiation would increase the tolerance of the skin for roentgen rays. This idea has been advanced occasionally until Sampson, in 1922, stated that previous general and local ultra-violet radiation rendered a skin area more resistant to X-radiation, and that the bad effects of excessive X-rays could be neutralized by subsequent actinic radiation. He cited clinical cases to prove his contention, but these were not controlled, and he relied exclusively on the erythema (32) as a basis for judging the extent and intensity of the resulting reaction.

MacKee and Andrews (33), in a thorough review of the literature, discussed certain fallacies in Sampson's conclusions, and

cited some experiments which they had performed on human skin showing that ultra-violet radiation at or near the time of roentgenization will increase the X-ray effect.

Pfahler (34) radiated rabbits' ears with ultra-violet and roentgen rays and the combination of both forms of radiation. He used medium wave unfiltered radiation—about six times the human erythema dose. The ears receiving both forms of radiation showed greater reaction, which was striking at times. This careful work was probably the first to be done along these lines.

Halberstädter and Simons (29) increased the X-ray effect on human skin by the use of ultra-violet radiation.

McArthur (35) detailed the serious results following ultra-violet irradiation in a case of X-ray dermatitis of six months' standing. Massive necrosis followed immediately after two applications of ultra-violet radiation. On the other hand, Lars Edling (36) used a combination of actinic and roentgen rays in treating tuberculosis of the lymph nodes, and did not observe any untoward reactions.

It would seem that most of the careful work tends to show that there is an actual sensitization, particularly if the two forms of radiation are applied closely together in point of time. The lack of penetration of ultra-violet radiation would probably limit its use as a sensitizing agent to the most superficial lesions only.

#### THE EFFECT OF THE ELECTRIC CURRENT

The flow of the direct electric current has a profound action on the tissue. Voltz (39) has called attention to the similarity of histological features of the ovary of the guinea pig which has been subjected to heavy direct current and one which has received a heavy dose of X-rays.

The local polar effects are of particular interest. At the negative pole we notice,

among other phenomena, that vasodilation occurs, there is irritation, and the reaction is alkaline. Since polar reactions are opposites, there is vasocontraction and a sedative effect at the positive pole, and the reaction is acid. It is interesting to note that the changes at the negative pole, which have been mentioned, are those which we have seen will increase the sensitivity of the tissues to X-radiation. In addition to the polar effects, there is a certain degree of heat generated.

The direct electric current has been used to sensitize tissues with the idea of driving heavy metal ions into the tissues to act there as secondary radiators. Wintz (38) claimed clinical results by this method in carcinoma of the cervix. It has been shown, however, that the current tends to desert the slower moving ions of the heavy metals for more swiftly travelling ones. As a result, the metal is deposited in the superficial layers of the tissue (37). It is entirely possible that the good results obtained, as has been suggested by Voltz (39), may be due to the effect of the current alone.

It has been asserted that irritation of the skin by the galvanic current gives rise to an immediate primary and delayed secondary reaction similar to the cyclic reaction following the application of mustard oil. Schwarz suggests the use of the galvanic current as a sensitizer.

We (40) have undertaken experimental work to show the effect of the direct current on tissue sensitivity. At present the work is still quite in the preliminary stage, but some interesting results have been obtained. In controlled experiments with low currents we have been able to produce severe lesions in the skin of the rabbit by applying the negative pole to a heavily irradiated area which had just previously received soft X-rays (80 K.V.) unfiltered. The lesions (deep ulcers, healing slowly, with a heavy scar), are strikingly more severe than the

controls and those produced by causing an electric burn, using the same factors. With the positive pole we find that either there may be no noticeable effect, or else that there is occasionally an actual diminution of the intensity of the reaction. A great deal more remains to be done, particularly with heavier currents, before definite conclusions can be reached.

High frequency currents when passed, under proper conditions, through tissue, among other phenomena, cause a vasodilation and a varying degree of heat. Soiland (43) has called attention to high frequency currents of the order of radiofrequency (short wave) as a means of thermogenesis.

Bering and Meyer (41, 9) diathermized one testicle of the rabbit. Both testicles received the same dose of X-rays. The one through which the high frequency current passed showed more intense reaction.

Wynen, as has been mentioned before, has found that diathermy applied before and during irradiation increases the sensitivity of the normal human skin from 30 to 40 per cent. He attributes this increase of sensitivity to the ensuing vasodilation. The resulting thermal changes and the possible effect of the current itself upon the tissues have not been given much consideration by this author. Cristoff Müller made clinical application of diathermy as a sensitizing agent and concluded that there were unknown factors which caused an increase of sensitivity.

The electric current can penetrate, is readily applied, and can be controlled as to intensity and time of application. The use of electric currents as possible sensitizing agents opens for investigation a wide field, which has been touched upon but barely. While we have seen that living tissue can be prepared, so to speak, to react more or less vigorously to X-radiation, a word of caution is in order. It perhaps would be better not to attempt to combine sensitizing agents with X-radiation in other than malig-

nant disease and then preferably only with an experimental background and with a thorough knowledge of all the known factors of the sensitizing agent it is desired to use.

#### CONCLUSIONS

A review of the experimental work in the field of artificial X-radiosensitivity has been made. It has been shown that normal tissue sensitivity can be altered by vascular and thermal changes, the application of irritating and toxic substances, ultra-violet radiation, high frequency alternating current, and possibly by the direct electric current. A plea is made for more interest and experimental work in this field as a possible means to better results in radiation therapy.

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## DISCUSSION

DR. G. FAILLA (New York City): I think this paper calls attention to a very important problem, the solution of which would lead to great advances in radiation therapy. At the present time there are certain types of tumor, in certain locations, etc., which can be treated effectively by radiation. Referring particularly to deep-

seated tumors, we may say that the only ones which are really amenable to radiological treatment are those which are very radiosensitive. In general, the factor which limits the effect produced in a deep-seated tumor is the *relative* sensitivity between tumor tissue and surrounding normal tissues. If, by any means, the ratio of sensitivity can be altered materially in the proper direction—that is, making the tumor tissue more sensitive relative to the normal tissues—better therapeutic results will be obtained. In spite of many attempts, up to the present not much has been accomplished along these lines. The problem is a difficult one and those who attempt to solve it deserve our encouragement. I hope that Dr. Carty will continue his good work.

DR. A. MUTSCHELLER (New York City): I would like to refer to just one point. Some of the causes of radiosensitivity may be secondary; for instance, a higher temperature may cause absorption of more moisture in the tissues, and perhaps the edematous condition resulting from the higher temperature is responsible for the increase in the radiation sensitivity. Moisture or, on the other hand, dryness, seems to have very much more to do with determining the sensitivity of tissues. I believe that this has

been observed in the production of erythema reactions, etc. A dry skin seems to stand much more radiation than a swollen skin, and for that reason it may be useful to control these factors more carefully.

DR. CARTY (closing): There are so many factors that enter into this problem, particularly with the use of the direct current as a sensitizer, that it seems almost hopeless to evaluate and differentiate them, but I believe that the production of heat and ensuing vasodilation play a considerable part. This brings up an important point which must be borne in mind by all those doing experimental work in tissue sensitization—if unfiltered soft radiation is used with the tube close to the skin and with a hot target, the heat so generated may be sufficient to sensitize the tissues to a certain extent. Our experience coincides with that of Hawkins and Clark in this respect. It was with considerable hesitation that this paper was read for fear that there might be an indiscriminate application of sensitizing agents, with possible unfortunate results. It should be attempted only in malignant conditions and then preferably with an experimental background and thorough knowledge of all the known factors of the particular sensitizing agent it is desired to use.

## IDIOPATHIC ULCERATIVE COLITIS<sup>1</sup>

By E. E. CLEAVER, M.D., TORONTO, ONTARIO, CANADA

ULCERATION of the colon may occur from any one of many causes.

Organisms within the colon may produce mild or severe grades of inflammation and ulceration. To this type belong *Endamæba histolytica*, dysentery bacilli, and the bacilli of tuberculosis. As the colon is an organ of excretion, ulceration may occur as the result of the excretions of disease toxins, poisons, and drugs. Colonic ulceration is occasionally seen in the terminal stages of nephritis, also after the administration of arsenic and mercurochrome.

Among the various types of ulceration of the colon is one described as idiopathic ulcerative colitis. This disease has a definite clinical picture, typical roentgen-ray findings, and a characteristic sigmoidoscopic appearance. It was first mentioned by Wilkes and Moxon in 1875, and first described by White in 1888, although Hawkins believes the "pedigree" of this disease can be traced back nearly three hundred years to the "blood flux" of Sydenham in 1669.

Most patients with this disease can definitely date their trouble to an acute respiratory infection, such as a cold or tonsillitis or to infection in some distant part of the body. Further, with each successive cold, an acute exacerbation of the colitis occurs. It has further been noted that eradication of the foci, such as infected teeth and tonsils, is followed by severe exacerbations of the disease, sometimes with prostration and many bloody stools.

Chronic ulcerative colitis is a disease of the colon which usually begins at the rectum, sometimes at the muco-cutaneous border of the anus. It may remain localized in the

rectum or it may extend upward as far as the ileum.

This disease is characterized by diarrhea, continuous or intermittent, with pus, blood, and mucus in the stool, emaciation, debility, progressive anemia, and frequently a marked pyrexia. It has been described under various names, such as idiopathic ulcerative colitis, non-specific ulcerative colitis, asylum dysentery, and chronic ulcerative colitis. It has been regarded as a non-specific colitis by most authorities except the Mayo school.

Buie, Bargaen, and Logan of the Mayo Clinic feel that they unquestionably have discovered the organism causing this disease. Bargaen has described it as a gram-positive diplococcus, lancet-shaped and slightly larger than the pneumococcus. It is not capsulated and shows little tendency to grow in chains. It has definite cultural features. He has obtained scrapings from the base of ulcers in which he first identified his diplococcus; then he injected animals intravenously with from 2 to 5 c.c. of the 24-hour dextrose brain broth culture, containing the organism in predominance. Lesions were produced in the colon which were, in all essentials, like those of chronic ulcerative colitis in man. The disease seemed to select the lower colon for primary attack. The organism was re-isolated from the mesenteric lymph nodes and blood stream, and, when reinjected, produced similar lesions. Most striking in this connection was the isolation of the diplococcus from the periapical abscesses of patients during acute exacerbations of the disease. With these organisms, Bargaen succeeded in producing characteristic lesions in the colon. This was also accomplished with cultures from the tonsils.

Recently, Paulson, of the Johns Hopkins

<sup>1</sup>Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2-6, 1929.

Hospital, has carried on experimental studies in a series of 14 cases of chronic ulcerative colitis. His opinions, after an extensive study, are (1) that the specific organism of ulcerative colitis has yet to be discovered; (2) that Bergen made his vaccine filtrate from original or primary cultures, and therefore was using a mixed vaccine or vaccine filtrate; (3) that his good results were obtained after varying and long periods in a disease which has natural remissions, and (4) that his patient received treatment in addition to the use of his vaccine therapy. It may also be added that Paulson was able to produce in the colon similar lesions to those produced by Bergen by injecting intravenously types of bacteria from sources other than the bowel of patients with ulcerative colitis. Grossly and microscopically, the lesions produced in the colon were not unlike those seen in rabbits injected with organisms from cases of ulcerative colitis.

This disease, when seen by the physician, is characterized by a diarrhea, the patient frequently having from four to thirty movements during the twenty-four hours. There is generally marked dehydration, emaciation, and debility. Frequently, pyrexia is a prominent symptom and myocarditis and arthritis are often associated with this condition. The previous history in these cases is suggestive in one particular only—that is, nearly every patient gives a history of having had one or more previous attacks of diarrhea. Frequently, the diarrheal attack may have lasted only twenty-four hours and there has been entire remission of symptoms for a period of months or even years. Some of the patients that we see in hospital practice are desperately ill and the problem of meeting the emergency is very acute. Other patients are also suffering with vomiting, besides the diarrhea, which greatly complicates the treatment. These cases generally present a severe degree of anemia of the secondary type. The gastric analyses in a small per-

centage of cases show the absence of free hydrochloric acid, but they are not benefited by treatment with dilute hydrochloric acid.

The stool is fecal, with pus, blood, and mucus—it often shows a high percentage of pus, not infrequently, 75 to 90 per cent.

Two methods have proven of value in diagnosing this condition: first, the sigmoidoscope, and second, the roentgen ray. With the sigmoidoscope, we are able, in a series of cases, to see one or more of the five stages described by Buie. In the *first stage* a diffuse hyperemia affects the mucosa of the bowel, usually more marked near the anus and lower rectum. Above this, the inflamed mucous membrane appears to fade away into normal mucous membrane. In the *second stage* the edema or thickening of the mucous membrane is marked; the hyperemic stage still persists; the slightest trauma with the end of the sigmoidoscope, or even with a cotton swab, produces bleeding, and the mucous membrane is very easily broken. In *stage three* the presence of miliary abscesses of an average size of about 1 mm., situated diffusely through the diseased area, presents an appearance that is diagnostic. In *stage four*, which is really an advanced third stage, we see the abscesses rupture and leave miliary ulcers, which appear as numerous yellow spots scattered over the wall of the bowel. When these spots are wiped off with a cotton swab, the bleeding bases of the ulcers appear as myriads of red spots. In *stage five* these small healing ulcers are followed by pock-like scars, described by Buie as the "footprints of previous activity."

During the periods of activity, the infective process extends into the submucosa and muscular layers and there is a marked inflammatory reaction, as indicated by the extensive lymphocytosis. The bowel appears pipe-like—narrowed; occasionally the whole of the colon may be constricted to a diameter of 1 centimeter.

The X-ray appearance of the large bowel, with the barium enema, is characteristic. The bowel presents a sausage-like tumor, with an absence of haustration. Flocculent deposits of barium around the periphery of the bowel are evidence of a very extensive ulceration, and make the prognosis exceedingly grave.

#### PROGNOSIS

The prognosis in this disease is difficult. We have frequently noted—when symptoms have entirely disappeared—on sigmoidoscopic examination, that there is definite evidence of activity in the rectum or sigmoid. Frequently, there may be one or two ulcers that have not healed. As long as there is definite evidence of activity in the rectum or colon, we must be very guarded in our prognosis and keep the patient under close observation. When examination with the sigmoidoscope reveals no evidence of activity, we may feel that, in all probability, the ulceration above this point has healed.

The roentgen ray is also very valuable in assisting us as to prognosis. The roentgenologist is often able to tell with a fair degree of definiteness as to the return of function of the colon. The reappearance of the haustra indicates a subsidence of the inflammation.

From the history of cases of ulcerative colitis, it would appear that this condition may extend over a period of several years. As to the ultimate result, we probably have not observed a sufficient number of cases over a period long enough to warrant the making of a definite statement. In my opinion, the hope lies in getting the early case and insisting on the patient's returning frequently for observation (at least every six months). Investigation then should consist of examination of the stool for pus and blood, sigmoidoscopic examination of the rectum and colon, and a barium enema.

#### DISCUSSION

DR. PAUL C. HODGES (Chicago): It was my misfortune to hear only the end of Dr. Cleaver's paper on "Ulcerative Colitis," so I cannot discuss his work.

I should, however, like to ask a question: Do gastro-enterologists on viewing the lower intestine through the proctoscope or seeing the whole of it at the autopsy table recognize an organic lesion that they can correlate with the straightened, non-haustrated colon sometimes seen at X-ray examination?

DR. E. P. McNAMEE (Cleveland): I would like to ask Dr. Cleaver whether or not he has made any observations in regard to finding X-ray evidence which did not go with a chronic colitis, when there was clinical evidence of it present? I observed a woman about thirty years of age who had all the clinical evidence of a colitis, and the X-ray evidence showed haustration with smooth contour—not the feathery type—suggestive of a spastic colitis, notwithstanding the fact that she had many evacuations each day. About six months later she had X-ray evidence of ulcerative colitis, and the *Bergey* bacillus was said to have been found. I examined her a year later and found typical X-ray evidence of chronic ulcerative colitis, with straightening and narrowing of the colon, and again the *Bergey* bacillus was found.

DR. CLEAVER (closing): I may say, in answer to the question brought up by the last speaker, that occasionally at the Toronto General Hospital we see cases for which, from a clinical standpoint, there is definite evidence of ulcerative colitis, yet we cannot get confirmation from the X-ray department.

One of the things on which we place much stress, besides X-ray examination, is the stool. I think the stool is very characteristic. That is to say, the stool is fecal in

character and consists of a large amount of pus—up to 90 per cent—some blood, and a small amount of mucus. We have had Dr. Dickson, whom you all know, report cases which he felt sure were ulcerative colitis, in which the clinical picture did not coincide;

so that we have had really both sides of the picture presented to us. The last lantern slide I showed you to-day was of a case in which there was not any definite clinical evidence of ulcerative colitis, yet the X-ray was characteristic.

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**The Development of Roentgenology in Austria. Guido Holzknacht. *Strahlentherapie*, 1930, XXXVI, 403.**

This paper is the presidential address given before the meeting of the German Roentgen Ray Society in Vienna, 1929. It sketches the development of roentgenology in Austria, followed by a most interesting discussion of the two tendencies apparent to-day: central-

ization of all radiological work in a roentgen institute, and decentralization by allotting each specialty an X-ray laboratory of its own. The author shows that the logical development lies in centralization because that alone will guarantee progress in roentgenology.

This article is food for thought for all of us interested in the future of our specialty.

E. A. POHLE, M.D., PH.D.

## GASTRO-INTESTINAL OBSTRUCTIONS<sup>1</sup>

By SAMUEL BROWN, M.D., CINCINNATI, OHIO

**A** REVIEW of the recent literature dealing with gastro-intestinal obstructions, especially those of the acute form, reveals two amazing facts: (1) Notwithstanding the great progress made in the advancement of our knowledge of clinical

C. J. Miller, of New Orleans (1), found that in 343 cases of intestinal obstructions, 209 patients died, a gross mortality of 60.9 per cent. A. H. Burgess, of London (2), found that in 1,042 cases of intestinal obstructions studied by him, 395 patients died,



Fig. 1-A. The small and large bowels are distended with gas.



Fig. 1-B. The colon is filled with an opaque enema which is not obstructed. Within the hollow of the colon there is shown a gas-distended coil indicating the presence of an obstruction.

observation, physical examinations, and the introduction of new methods, such as the X-ray, the mortality of acute intestinal obstruction still remains high; (2) in spite of the constant use of the X-ray in the examinations of the gastro-intestinal tract physicians and surgeons appear to have very little knowledge of its usefulness in the diagnosis of acute obstructions.

<sup>1</sup>Read before the Radiological Society of North America, at the Fifteenth Annual Meeting, at Toronto, Dec. 2-6, 1929.

a gross mortality of 37.9 per cent. J. P. North, of Philadelphia (3), collected the mortality statistics from a series in the literature totalling 1,625 cases of intestinal obstructions, including 200 patients of his own, of whom 425 died, a gross mortality of 29.2 per cent. W. F. Cheney, of San Francisco (4), in his monograph greatly deplores the high mortality in acute intestinal obstructions. All of these writers give the same



Fig. 2. The colon is filled with an opaque enema. Within the hollow of the colon several gas-distended coils of small bowel are shown, indicating the presence of obstruction.



Fig. 3. The stomach is displaced upward. On the left side of the abdominal cavity there is shown a greatly distended coil containing barium. This was found to be due to a strangulated hernia.

reason for the high mortality, namely, failure to make an early diagnosis and delay of surgical intervention. No one, with the exception of Dr. Miller, mentions anything about the use of the X-ray in the diagnosis of acute intestinal obstruction, and he does so only to contra-indicate its use. It is quite evident, therefore, that the rank and file among physicians and surgeons know still less of the use of the X-ray in acute intestinal obstructions.

In contrast with the lack of knowledge on the part of physicians and surgeons, let us see what radiologists have to say on this subject.

Dr. James T. Case (5), as long ago as 1915, has the following to say: "Acute intestinal obstruction is a condition in which, until now, the X-ray has not been regarded as a means of diagnosis. During the past five years, however, the writer has seen a

number of cases of acute small intestine obstruction in which the X-ray gave advance information of a decisive character before it was possible by other clinical means to make a definite diagnosis of small intestine obstruction." He also tells us how to recognize it. "It is not necessary to administer bismuth for this purpose. The characteristic reticulated appearance of the shadow cast by the gas-distended small bowel in cases of acute obstruction is pathognomonic and no bismuth is necessary." Since then, Dr. Case has written several other papers dealing with the same subject. Other radiologists have from time to time emphasized the importance of the use of the X-ray in acute intestinal obstruction, and yet the medical profession at large remains ignorant of its true value.

It is my opinion that the high mortality in acute intestinal obstruction would under-



Fig. 4-A. Several coils of small bowel are shown to be distended with gas and barium and the distal end terminates abruptly in the umbilical region.



Fig. 4-B. Opaque enema shows a deformity in the upper region of the sigmoid flexure which is close to the small bowel obstruction. This was found to be due to carcinoma of the sigmoid and adhesions to the small bowel, thus producing a double obstruction.

go a marked reduction if the profession would learn that in the X-ray method we possess a great instrument, which can and will establish an accurate diagnosis long before the clinical manifestations become apparent and at a time when surgical intervention will effect a cure in the greatest number of cases. I know from personal experience that many lives have been saved just because I kept these facts before the attention of my medical and surgical colleagues.

During the past ten years I have collected a large number of cases of gastro-intestinal obstructions. In analyzing them in reference to their clinical manifestations and X-ray findings, I find that they fall into one of the following four groups:

*Group 1. Positive clinical evidence of obstruction.* This group comprises a large number of cases. The X-ray is not absolutely essential to establish an accurate diagnosis, but even here the X-ray will deter-

mine the exact location of the obstruction, its nature and degree—all important facts upon which to base a correct prognosis. These cases were found, as a rule, to be far advanced. Surgical intervention, though instituted in a large number of cases, did not result satisfactorily. The mortality in this group was very high.

*Group 2. The clinical evidence of obstruction is either absent or, if present, is only suggestive of a possible obstruction.* This was found to be a large group. The X-ray offers the only means of establishing a diagnosis. Surgical intervention in this group of cases results in a high percentage of recovery.

*Group 3. Clinical evidence of obstruction, but with negative X-ray findings.* This group comprises a small number of cases, in some of which the clinical evidence of obstruction is so marked that the surgeon has disregarded the X-ray findings, only to dis-



Fig. 5. The colon is filled with an opaque medium and shows no obstruction. Within the hollow of the colon there is shown a greatly distended coil containing barium, the residue of a barium meal given 24 hours previously.



Fig. 6. The stomach is displaced upward and to the right by a markedly distended jejunum containing barium and gas as a result of an obstruction.

cover that no obstruction existed. Many of such cases, however, have been saved from an unnecessary operation.

*Group 4. Presence of clinical and X-ray findings of obstruction and yet the surgeon fails to discover the obstruction.* This group is very small and for practical reasons may be disregarded. The only explanation that can be offered is the possibility of a pseudo-strangulation. The possibility of a spontaneous reduction as a result of the anesthesia should also be considered.

Several cases of acute intestinal obstruction have been chosen for discussion more or less in detail.

**Case 1 (Figs. 1-A and 1-B).** This patient was under the care of two physicians for some acute gastro-intestinal disturbance. No clinical diagnosis of obstruction was made. At my suggestion the patient was brought to the hospital. A plain X-ray film of the abdomen revealed gas-distended bowels. A

barium enema showed no obstruction in the large bowel. Within the hollow of the colon the gas-distended coils of the small intestines could readily be recognized. A diagnosis of acute obstruction of the small bowel in the region of the terminal ileum was made. Operation revealed that an adhesive band caused the obstruction. Patient recovered.

**Case 2 (Fig. 2).** The patient was brought to the hospital for an acute condition of the abdomen. The clinical diagnosis was indefinite. X-ray examination revealed a normal colon and, within its hollow, the gas-distended small bowel. The diagnosis of acute intestinal obstruction was confirmed by operation. Patient made a good recovery.

**Case 3 (Fig. 3).** This patient was brought to the hospital complaining of gastro-intestinal disturbances, and an examination made. The stomach was found to be normal. The jejunum for some twenty-four inches was found greatly dilated by the barium meal.



Fig. 7-A. A plain film of the abdomen showing gas-distended bowels.



Fig. 7-B. The colon is filled and shows no obstruction. Within the hollow of the colon several coils of small bowel are greatly distended, due to a strangulated hernia.

the dilated coil abruptly terminating in the left inguinal region. A barium enema revealed a normal colon. A diagnosis of acute intestinal obstruction was made, with the suggestion also that, because of the region of obstruction, it might be due to a strangulated hernia. The diagnosis was fully confirmed by operation. Patient recovered.

Case 4 (Figs. 4-A and 4-B). This patient was brought in for a complete X-ray study of the gastro-intestinal tract because of gastric symptoms. A barium meal revealed a normal stomach. Several coils of the jejunum were found to be dilated, the distal end terminating in the umbilical region. A barium enema revealed a constant deformity in the upper end of the sigmoid flexure, which was diagnosed to be due to a malignant growth. Because of the close proximity between the region of the sigmoid deformity and the terminal end of the obstructed small bowel it was suggested that the obstruction of the small bowel was due to adhesions to the malignant growth. Operation confirmed

the diagnosis. While the acute obstruction was relieved, the patient finally died as a result of the newgrowth.

Case 5 (Fig. 5). Several weeks after an abdominal operation for pelvic trouble this patient began to complain of gastro-intestinal disturbances. An X-ray study revealed a large residue in the greatly dilated small bowel after a twenty-four hour interval. Marked hyperperistalsis was observed fluoroscopically. Forty-eight hours later the small bowel was found to be empty. A diagnosis of a high degree of obstruction was made and an operation was recommended. This was refused by the patient. She was cautioned that an acute obstruction might supervene at any time. Several days later symptoms of an acute obstruction developed. Operation revealed the presence of an adhesive band, producing the obstruction. Patient made a good recovery.

Case 6 (Fig. 6). This patient was admitted to the hospital with symptoms of a possible obstruction. An X-ray examination



Fig. 8. The plain film of the abdomen shows a gas-distended small bowel, found to be due to an obstruction as a result of a strangulated inguinal hernia.



Fig. 9. The gas-distended small bowel is readily recognized and was found to be due to an obstruction caused by an adhesive band.

was carried out. The stomach was found to be displaced upward and to the right by a markedly distended jejunum. Immediate operation confirmed the diagnosis of an acute obstruction of the small bowel. Patient recovered.

Case 7 (Figs. 7-A and 7-B). This patient was admitted to the hospital for an "acute abdomen." A plain X-ray film revealed greatly distended bowels. A barium enema revealed a normal colon. Within the hollow of the colon the gas-distended small bowel could be differentiated. A diagnosis of acute obstruction was made. Operation disclosed a strangulated hernia. Patient recovered.

Case 8 (Fig. 8). This patient was referred to my office for a complete gastrointestinal examination: evidently his symptoms were not of such a character as required hospital care. A plain film showed a greatly distended small bowel. A barium meal and enema revealed nothing abnormal in the stomach or colon with the exception

of their displaced positions. A diagnosis of acute intestinal obstruction was made. At my suggestion the patient was taken to the hospital and operated upon. A strangulated inguinal hernia was discovered. Patient recovered.

Case 9 (Fig. 9). This patient was also referred to my office for a complete gastrointestinal series. A plain film of the abdomen showed a gas-distended small bowel, consisting of several coils arranged parallel to one another. The stomach and colon were found to be normal. A readily made diagnosis of acute intestinal obstruction was confirmed at operation, an obstruction due to intestinal adhesions. Patient recovered.

Cases 10 and 11 (Figs. 10 and 11). These two patients were brought from the country to the hospital, both victims of medical neglect. Their physical appearance pointed definitely to acute intestinal obstruction. Plain X-ray films of the abdomen revealed markedly gas-distended bowels. A barium



Fig. 10. The markedly distended bowel which consists chiefly of large gas pockets is as a rule due to obstructions in the colon. This was proven by a barium enema which showed the obstruction in the splenic flexure.



Fig. 11. The markedly distended bowel was found, by the injection of an opaque enema, to be due to an obstruction in the middle of the transverse colon.

enema in one case showed an obstruction in the region of the splenic flexure, while in the other obstruction was revealed in the middle of the transverse colon. Operation revealed malignant tumors in both cases. The condition of the bowels in both cases was found to be very poor and both patients died shortly after operation.

Case 12 (Fig. 12). This patient was admitted to the hospital with symptoms suggestive of a possible malignancy of the stomach. An X-ray examination showed a normal stomach. The jejunum was greatly distended. A diagnosis of a high degree of obstruction was made. Operation disclosed that a malignant growth was producing the obstruction.

Case 13 (Fig. 13). This little patient, an infant girl aged fourteen months, had been sick for several days before she was ad-

mitted to the hospital. A plain X-ray film of the abdomen showed markedly distended bowels. A diagnosis of acute obstruction was made. The operation, which was unfortunately delayed, showed the cause of the obstruction to be a volvulus. The baby did not survive the operation.

Case 14 (Figs. 14-A and 14-B). This two-days-old infant was unable to retain its food, and the presence of pyloric obstruction was considered. A plain X-ray film of the abdomen revealed a greatly distended small bowel. After a barium meal the jejunum, markedly distended by the barium, was readily recognized. A diagnosis of congenital atresia was made and confirmed by operation. The colon was found to be entirely absent. The infant did not survive the operation.



Fig. 12. The stomach is shown to be normal. The jejunum is greatly distended with gas and barium. The obstruction was found to be due to a carcinoma.

#### CONCLUSIONS

1. In the X-ray examination we possess an excellent method by which obstruction of

any degree can be diagnosed without difficulty.

2. The most serious cases of obstruction, such as the acute form which is responsible for the usual high mortality, can be recognized even on a plain X-ray film of the abdomen.

3. The use of the opaque meal or the opaque enema has never caused any harm to the patients.

4. The sooner the medical profession learns the true value of the X-ray in the diagnosis of acute intestinal obstruction, the sooner will there be a reduction of the high mortality, with the saving of many lives.

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Fig. 13. This gas-distended bowel was found in a baby 14 months old. Operation showed the obstruction to be due to a volvulus.

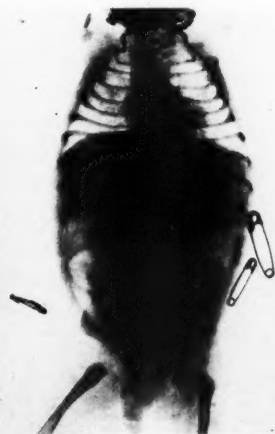


Fig. 14-A. This plain film shows large gas pockets in the bowel of an infant two days old.

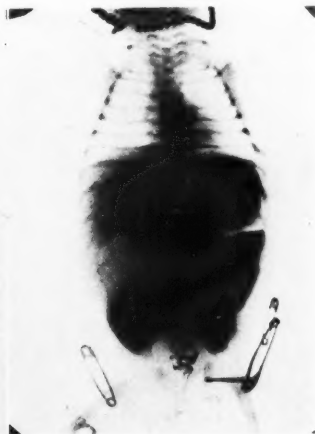


Fig. 14-B. Three hours later, after a barium meal, the small bowel is shown to be greatly distended. The obstruction was found to be due to a congenital atresia.

## DISCUSSION

DR. ELLIS R. BADER (Cincinnati, Ohio): We have all heard and enjoyed the beautiful demonstration given by Dr. Brown showing intestinal obstruction as revealed by the X-ray. It was not the desire of the essayist to claim anything new but to recall to us what has been done and what can be done with the X-ray in intestinal obstruction. This method has been known to the roentgenologist for many years; however, it has not been generally used by the surgeon. The simplicity of the examination commends itself in all questionable cases of obstruction, and the surgeon is given more assurance where the findings are positive. I feel that if we can broadcast this message to consultants, the essayist will be well paid for his efforts.

DR. JAMES T. CASE (Chicago): Since Dr. Brown has kindly referred to my pioneer work in the X-ray study of ileus, I will take a moment with your permission. My first work on this topic was done in relation to acute post-operative obstruction, occurring immediately after the operation—usually after abdominal operation—but the method is also applicable to the chronic obstruction.

I would like to emphasize something which Dr. Brown has not said in his talk, although he may have done so in his paper, that in the cases of chronic obstruction we should endeavor to show fluid levels of gas over liquid in distended coils, because these would help to differentiate between obstruction of the large and of the small bowel. If the patient is too ill to be put in the erect position to show such levels, it is quite feasible to put him upon his right or left side and to use a portable X-ray apparatus at the bedside, directing the ray parallel with the floor, with the film held vertically before or behind the patient, as the case may demand. As illustrated in the first case re-

ported by Dr. Brown, if we do not have it called specially to our minds we may overlook the fact that an obstructive lesion in the large bowel, even as far over as the sigmoid, may cause very much distention of the small intestine—really acute small intestine ileus. I remember one patient who had all the symptoms in the *right* iliac region, with all the indications of a rupture of the appendix. An operation was done, much pus and fecal smelling fluid found, and drainage put in, without attempting to interfere with the appendix. At postmortem, done three days later, there was found a rupture of the cecum, and the appendix normal, while a small ring carcinoma was discovered in the sigmoid, with almost complete obstruction. This same type of lesion can cause marked over-distention of the small bowel.

We have studied a number of cases which had no particular symptoms of acute obstruction—just cases after operation—and it was surprising to note the number that had a certain grade of ileus in the small bowel following operation. In other words, I am of the opinion that most abdominal operations are followed by more or less paralytic ileus. In many of the films we saw a marked distention of the right colon with gas, which was relieved by the administration of a small enema.

I do not quite agree with Dr. Brown in regard to his fearlessness in giving barium by mouth in suspected acute obstruction. I fear giving barium by mouth to a patient who has had an operation involving an entero-anastomosis. I recall one man who had had such an operation, and the surgeon had put some silk sutures on the back but not on the front of the anastomotic line. Barium was given, but the patient died two or three days later. At autopsy we found the anterior half of the new stoma wide open and a large cake of barium in the opening. I think in that case possibly the barium did some harm.

Fortunately, the mere inspection of the abdominal tract made by the aid of the gas present, without the administration of

opaque material, is usually sufficient. Certainly it is very informing in all cases of obstruction.

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**Investigations Regarding Sensitization to Roentgen Rays. II.—The Sensitization of Protozoa by Chemical Compounds.** S. A. Nikitin. *Strahlentherapie*, 1930, XXXVI, 539.

Previous investigators have reported that protozoa which are not susceptible to roentgen rays can be sensitized by chemical agents. (Change of  $\text{PH}$ , adding of  $\text{Hg Cl}_2$ , glucose,  $\text{HCl}$ , quinine, and phenol.) The author repeated these experiments and found that normal protozoa are not susceptible to roentgen rays. The different results obtained by other workers can, undoubtedly, be explained by a temperature effect, produced by the heat from the anticathode in the absence of a filter. There was also no effect of radiation on the division rhythm of *Paramecium caudatum*.

E. A. POHLE, M.D., PH.D.

**The Non-carcinogenic Nature of Purified Mineral Oils.** Francis Carter Wood. *Jour. Am. Med. Assn.*, May 24, 1930, XCIV, 1641.

The wide publicity given in recent years to the production of cancer in human beings by contact with lubricating oils, has caused considerable concern as to the possible dangers of using the heavy oils for therapeutic purposes. A study on a large scale of some widely used therapeutic products was considered advisable.

There was no evidence that purified mineral oils have any carcinogenic properties in the intestinal tract of rats. There is no reason to believe that if the refined oils used were not carcinogenic to the experimental animals they will be so to human beings.

C. G. SUTHERLAND, M.D.

## HEALING IN BONE TUBERCULOSIS<sup>1</sup>

By MALCOLM B. HANSON, M.D., and I. FENGER, M.D., MINNEAPOLIS, MINNESOTA

THE method of healing in any infection of a joint in which there has been bony destruction may be primarily classified under two heads:

(1) By fibrous union or replacement

new bone formation during the stage of repair.

In arthritis deformans and in purulent involvement of joints, it is recognized that there is usually quite marked new bone for-



Fig. 1, Case 1. Tuberculosis involving the second and third lumbar vertebrae, with new bone formation during state of repair.



Fig. 2, Case 1. Lateral roentgenogram of Case 1.

of eroded bones and cartilage by connective tissue;

(2) By new bone formation in and about the joint.

In this article we wish to consider only that class in which there is demonstrable

mation during the stage of healing; also in tuberculous joints in which there has been sinus formation, with consequent invasion by secondary organisms. It has been taught that there is never, or rarely, new bone formation in the repair of tuberculous joints other than in cases in which there are complications, as sinus formation and resulting secondary infection.

<sup>1</sup>Read before the Radiological Society of North America, at the Fourteenth Annual Meeting, at Chicago, Dec. 3-7, 1928.

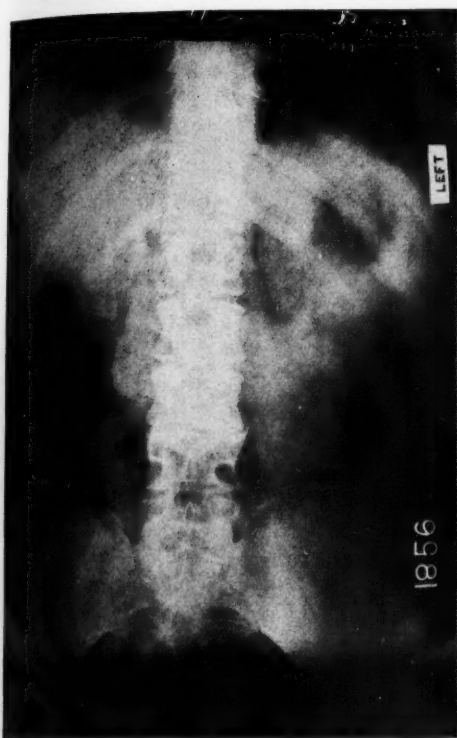


Fig. 3, Case 2. Tuberculosis of third and fourth lumbar vertebrae, with proliferation of bone about the articular margins of the vertebrae.

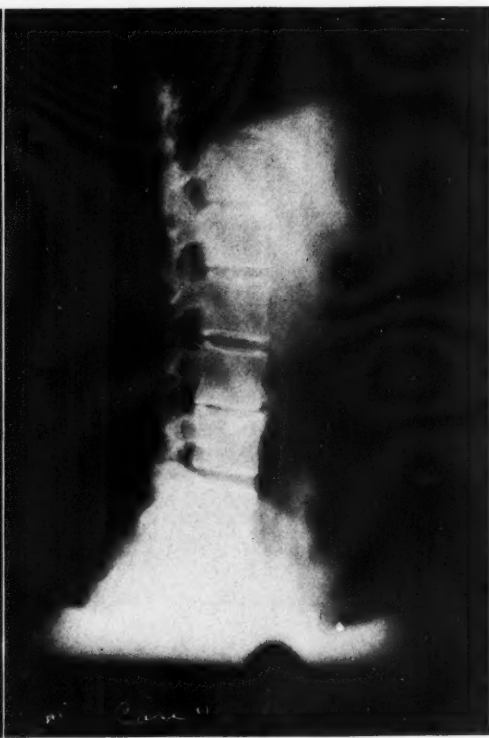


Fig. 4. Lateral roentgenogram of Case 2.

Baetjer and Waters, in the text, "Injuries and Diseases of Bones and Joints," make the statement that there is no new bone formation in tuberculosis. This premise is used to differentiate tuberculosis of the spine from various non-tuberculous diseases and also to differentiate tuberculosis from compression fracture.

Jones and Lovett in their text, "Orthopedic Surgery," in describing arthritis deformans, say that loss of the intervertebral space, accompanied by lipping and spur formation on the edges of the vertebrae, is pathognomonic of arthritis deformans. We have frequently seen these identical findings in proven cases of Pott's disease.

Cofield, in 1922, called attention to "bony

bridging in tuberculosis of the spine." Our experience corresponds with his, and we have found that not infrequently do we see quite extensive new bone formation in the repair of joint tuberculosis in cases in which there have been no communicating sinuses, with secondary infection. In our experience it has also been noted that healing by production of osseous tissue is more prevalent in tuberculosis of the vertebrae than in hip or sacro-iliac involvement. About 15 per cent of our cases of Pott's disease have demonstrable new bone formation during the stage of healing.

The differential diagnosis from an X-ray standpoint, between tuberculous joints, arthritis deformans, and some cases of sep-

tic joint disease, must occasionally lie, then, in the appreciation of secondary findings, as, for instance,

ing changes is occasionally necessary to warrant a positive diagnosis of Pott's disease.



Fig. 5, Case 3. Roentgenogram of the pelvis showing tuberculosis of the right hip, with new bone about the head and acetabulum.

- (1) Presence of paravertebral abscess;
- (2) Presence of accompanying pulmonary tuberculosis.

#### CONCLUSIONS

1. Tuberculosis of the joints and spine is frequently accompanied by definite bony bridging.
2. This finding is much more common in the spine than in the joints.
3. The presence of certain accompany-

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# ROENTGENOLOGIC STUDIES ON PHYSIOLOGIC MOTOR PHENOMENA<sup>1</sup>

(WITH THE AID OF THE CINEX-CAMERA)

By HANS A. JARRE, M.D., DETROIT, MICHIGAN

From the Roentgenological Department of the Grace Hospital, Detroit, Michigan, and the Laboratories of Dr. R. H. Stevens, Dr. H. A. Jarre, and Dr. C. K. Hasley.

THE purpose of this presentation is to stimulate interest in those physiologic problems which concern medical roentgenology, with the expectation that we may derive therefrom a better conception of organic and functional normalcy and disease, and thus may improve roentgenologic diagnosis.<sup>2</sup>

In July, 1929, we mailed to all members of this Society a reprint containing the description of our Cinex-Camera, Model 1. May I, therefore, assume that you are fairly familiar with this apparatus? During the Spring and Summer of 1929 we constructed a second model, which allows of greater speed and eliminates all objectionable interchangeable parts. The camera remains adapted to four widths of film bands, from 5 to 10 inches, so that sizes from 5 by 7 inches to 10 by 12 inches may be obtained at will. The films we are using remain equipped with paper leaders and trailers like ordinary photographic roll film, so that loading and unloading of the camera may be accomplished in broad daylight. No marginal perforation is necessary. We also adhered to the installation of a fluoroscopic arrangement by means of a screen and mirror under the object and gate, as it was

originally devised by Dr. Lewis Gregory Cole in his well-known table.<sup>3</sup>

We intentionally refrain from creating artificial enthusiasm and raising unjustifiably high expectations in regard to the accomplishments of our apparatus and in connection with our attempts at research, but want to point out that equipment of this type is useful in two ways: it permits of work, as I am to demonstrate it, and furthermore it can be a great time-saver in busy departments, where it eliminates much handling of cut films, cassettes, folders, etc., reducing all these motions to the insertion of a film band into a camera, turning a crank or pushing a button, and the processing of a long film band, which is quite simple.

Two groups of phenomena lend themselves to physiologic roentgenologic investigation: (1) those of motion which can be rendered radiovisible, and (2) phenomena of concentration and secretion of opaque substances as they are classically demonstrated by cholecystography. The second

<sup>3</sup>I welcome this opportunity to pay my respects to and express my admiration of Dr. Lewis Gregory Cole, who as early as 1910 demonstrated an apparatus for making moving pictures of the stomach, and in the *American Quarterly of Roentgenology* for March, 1912, published a "description of an apparatus for moving pictures of the stomach." In September, 1929, at the meeting of the American Roentgen Ray Society he was able to present as the result of his technical accomplishments since 1910 an excellently built table in which is incorporated a giant moving picture apparatus somewhat on the order of Dr. Groedel's Roentgen Cinematograph, permitting of exposures up to a maximum speed of four per second.

I tried in vain to interest one of the manufacturing companies building radiologic equipment in the task of designing and building a camera. Those approached considered the idea impractical or too extravagant, but now appear willing to utilize our designs without the intention of meeting any of its developmental expenses. For the construction of our cameras I am indebted to Mr. Albert Stoll, of Detroit, Mich., who previous to this work had had no experience whatsoever with anything related to roentgenology. His unselfish co-operation, which formed such a contrast to the attitude of some of our manufacturers, I cannot overestimate.

<sup>1</sup>Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2-6, 1929.

<sup>2</sup>Our intention was to present for your consideration, besides this paper, an extensive exhibit of films. Due to a decision of the Fire Department in regard to our nitrocellulose films we have had to forego the exhibit at the last minute after all preparations had been made. Of course it was not feasible to "in the interest of science . . . erect a metal-clad building or other temporary structure of fire-resistive construction in an isolated place . . . without any great expense . . . for the purpose of showing these nitrocellulose films," as proposed by the office of the Fire Marshal. Our demonstration, therefore, must be incomplete and rather cursory, stressing chiefly the main points and omitting much interesting detail.

group we have not attacked as yet though it suggests problems which promise to be extremely fascinating.

The roentgenologic study of motor phenomena may be approached by the fluoro-

study by others. The speed of serial roentgenography for the analysis of functional motor phenomena of course must be adapted to that of the particular motion under consideration. Apparently Dr. Cole and myself

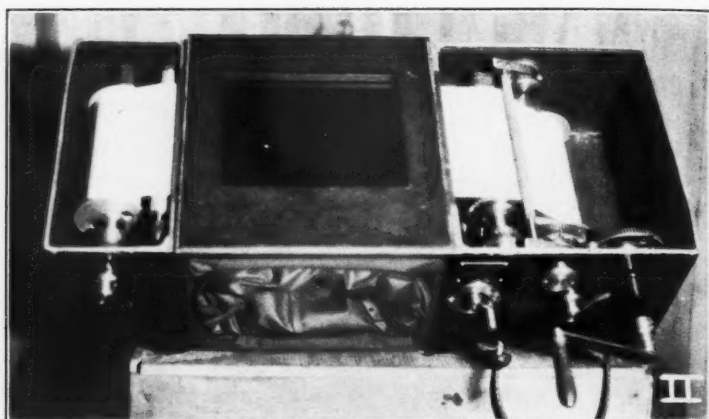


Fig. 1. Appearance of Cinex-Camera with cover partly removed. (Note film-band *in situ*—four different widths of such bands may be inserted—and facilities for fluoroscopic visualization of each exposure.)

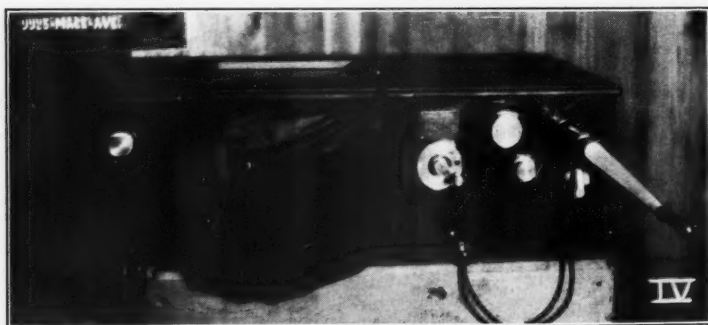


Fig. 2. Appearance of Cinex-Camera when closed and ready for use. (One may employ such equipment for serial roentgenography of individual patients or for the efficient handling of a large number of patients with a minimum requirement of time, material, and effort.)

scopic and radiographic methods. Without in any way attempting to discredit fluoroscopy as correctly and competently practised, it seems that for the purposes of research the procedure is less suitable for the evident reasons that the method is too subjective and leaves no record for reconsideration and

are in agreement in the assumption that a maximum rate of four exposures per second will be sufficient for practically all necessary studies except those of the heart, which will require exposures preferably of the slow-motion type. May I repeat on this occasion that our intention is not to produce X-ray

"movies," but merely to analyze motion which may be recorded roentgenologically.

#### EXPERIMENTS WITH THE CINEX-CAMERA

(A)—The roentgenographic recording of the appearance of joints in all imaginable positions and postures seems to be a task well worth our attention. We are accustomed to obtain and study joint films in two standard projections, made as closely as possible at right-angles to one another. Not infrequently our efforts to obtain standard positions fall short more or less, and we obtain so-called somewhat atypical roentgenograms. Often it is extremely difficult to determine or rule out the presence or absence of pathology from such plates. We are at-

tempting now to secure a collection of roentgenograms of normal joints in every position which may occur, with functional or postural variations. For this work the Cinex-Camera is not a necessity, of course, but certainly it is a great convenience and time-saver. We already have obtained several such film bands and hope to present at a future date such an atlas on normal joints. When this is completed, the function of pathologically deformed joints, which is of such great economic and judicial importance, will be made the subject of further study.

(B)—The exploration of the female generative organs with iodized oil promises interesting information. A number of functional studies have been conducted in co-

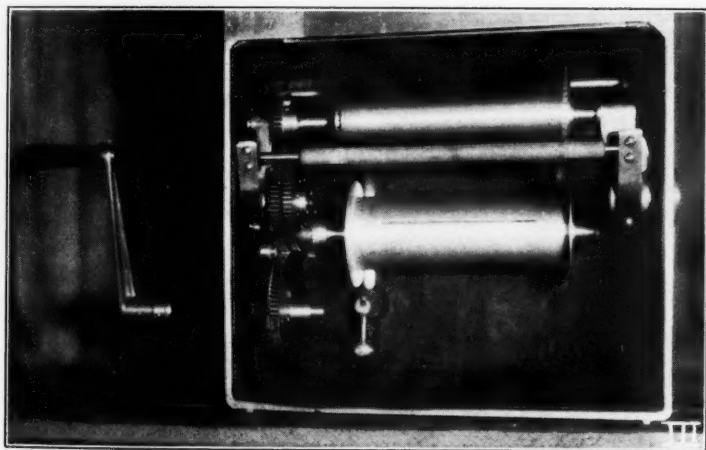


Fig. 3. Film timing and winding mechanism.

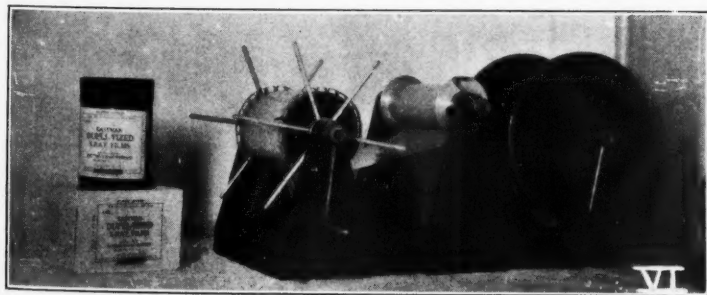


Fig. 4. Equipment for processing film bands.

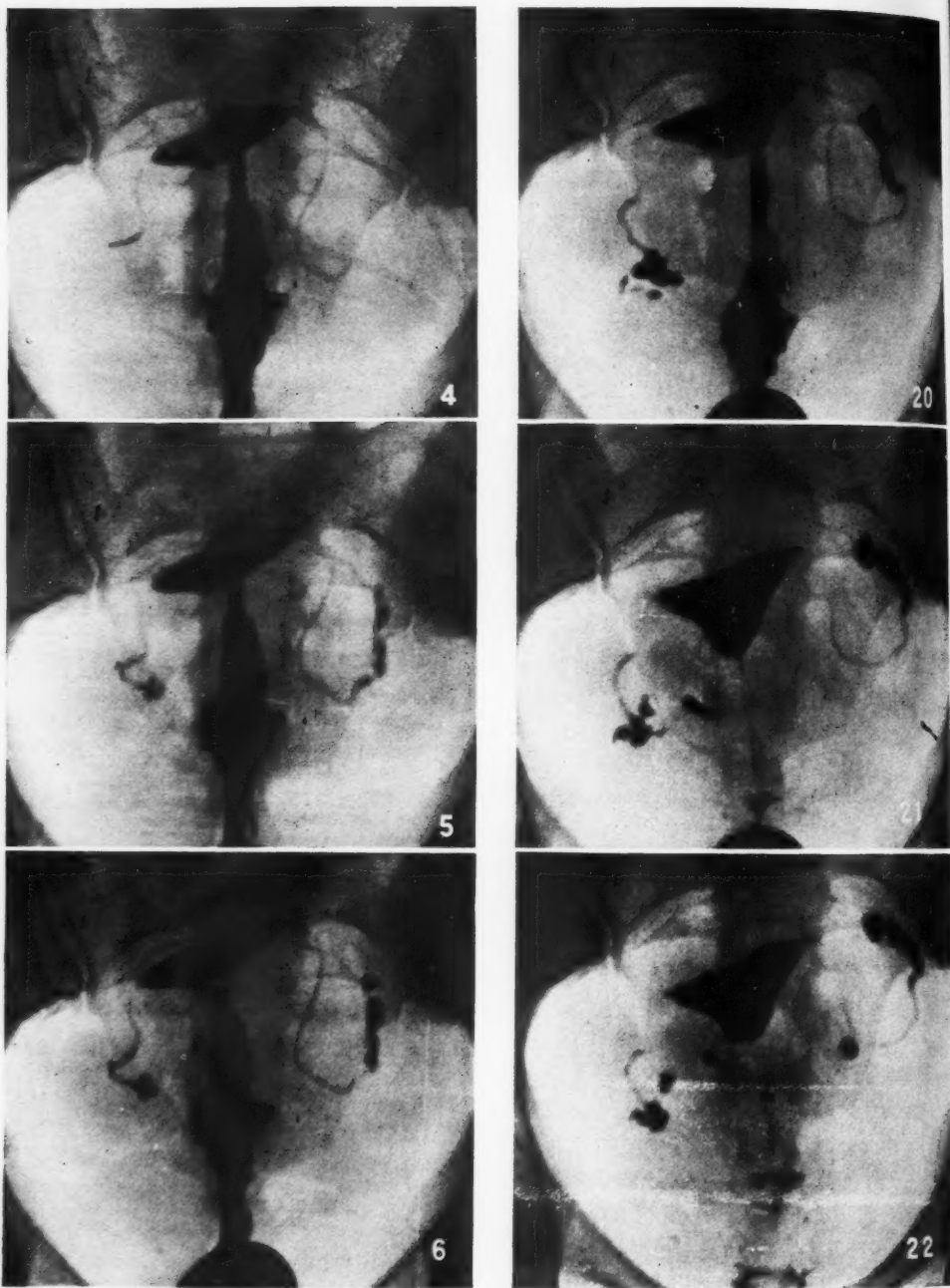


Fig. 5. Serial hysterosalpingography. Note tubal sphincter at uterine ostium, tubal bulb; endocervicitis and atony of uterus. Both tubes normally structured, patent. (Probably normal mechanism of transportation in tubal canals.)

As reproduction of the entire film-band was not feasible, a few sections, showing progressive stages of characteristic importance were selected. Numbers in the corners indicate the succession in the film-band.

operation with Dr. Milton A. Darling, but the material available to date has not been sufficient to permit of convincing conclu-

study—by Russian authors. We have also found pronounced differences in uterine motility, tonus, and ability to eject the foreign

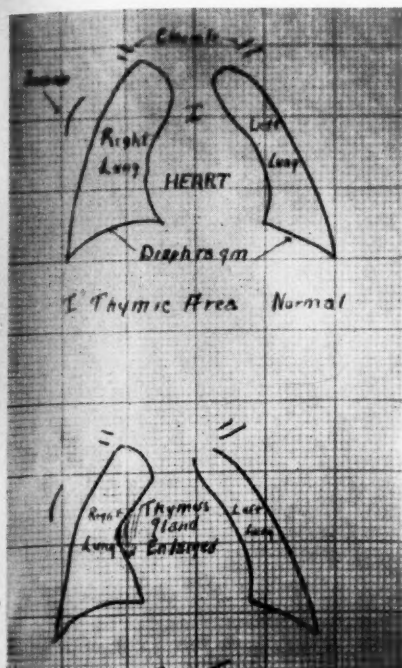


Fig. 6. Actual skeletal tracings of the heart, mediastinum, and lung fields as outlined by the inside of the thoracic cage. The various structures of Figure 6 are labeled and, given along with Figure 7, explain the grouped skeletal outlines of Figures 8 and 9.

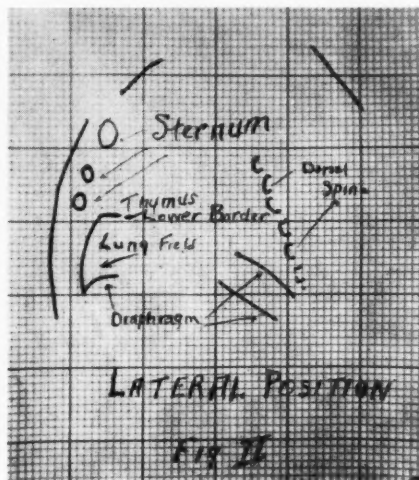


Fig. 7. Actual tracings (of a lateral exposure) of a film which was made with the infant's right side against the camera. Note the lines which represent the diaphragm as well as the inferior outline of the thymus. Observe how these lines change their relative position in the last six outlines of Figure 9. There is some change in the relative position of the heart, mediastinum, and bony landmarks. It is not as striking, however, as in the anteroposterior position.

sions. Usually with these patients the questions of patency of the Fallopian tubes or of the structure of the uterine cavity were to be answered. However, on conducting such an examination with the Cinex-Camera we have demonstrated, besides anatomic variations and pathology, the existence of a sphincter and the formation of an ejaculatory bulb at the uterine tubal ostium, as previously described—chiefly from fluoroscopic

material which was introduced. Tubal function certainly varies to such a degree that intense further investigation appears justified, and possibly may lead to the explanation of many a case of so far unaccounted-for sterility. We also must expect that different degrees of uterine and tubal inflammation will produce characteristically varying functional behavior, similar to that which I will demonstrate farther on in the case of the bronchial tree and urinary tract. This, in turn, is apt to alter to an extent as

yet uncalculated our diagnostic and prognostic conceptions and markedly influence our present rationale of treatment.

enza or whooping cough), tumors, cysts, etc., can readily be detected to account for certain symptoms. At the same time, this

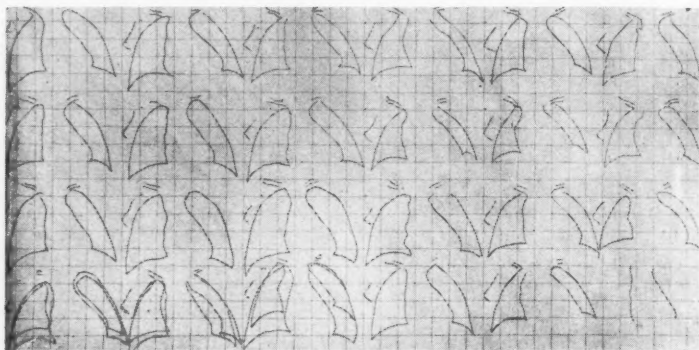


Fig. 8. Twenty-seven skeletal tracings from one roll film of a child aged two, who in early infancy was treated for an enlarged thymus. "Inspiratory-crow" is still present during excitement. We believe that the increased width of the supracardiac mediastinal shadow, as shown on some of the films, is secondary to respiratory and circulatory changes. The irregular outline of the right border of the heart on some is due, we believe, to superimposed shadows of the aorta, superior and inferior venæ cavæ. The right scapula formed the fixed point in these comparative drawings. Note that the movement of the clavicles is slight, and that the change in the cardiac and mediastinal outline varies considerably from time to time. (The double tracings are presented for contrast and are selected to show the extremes in the change in heart outline, with its relative effect on the thymic shadow.)

(C)—STUDIES ON THE CHEST AND MEDIASTINUM IN INFANTS AND CHILDREN

In recent years thymus disease has become unduly fashionable in certain quarters, including Detroit, where for a while about 95 per cent of all new-born were declared affected. We are far from attempting to decry routine examination of neck and chest in children as practised everywhere; rather, we wish to stress the necessity of proper routine examination of the chest for possible pathology, and can hardly over-emphasize the importance of Dr. Pancoast's teachings relating to this subject. Many unsuspected conditions, such as retropharyngeal abscess, foreign body (opaque and non-opaque), atelectasis, birth injuries, cardiac and vascular abnormalities, tracheobronchial lymphadenitis (possibly due to influ-

list of possible pathological conditions, to which must be added cerebral edema demonstrable by other methods, may remind you again that the chances of a child's being in danger on account of thymic hypertrophy are rather slight in comparison to other possibilities. Like edema of the glottis, thymic stridor, and thymic interference with respiration, rather, are the results of pathology than the causes of symptoms. We feel ourselves—and believe we have conclusive proof for this assumption—that, while pathologic thymic enlargement does occur, it is very rare. In most of the cases it certainly cannot be diagnosed roentgenologically by the usual routine single-film examination, even if performed with the patient in different postures.

The configuration of the composite mediastinal shadow may be influenced by the fol-

lowing factors: The cardiac cycle of systole and diastole; the alternating injection and contraction of aorta, pulmonary artery, and

certain symptoms, and guard us against falling into pitfalls of single-film examination.

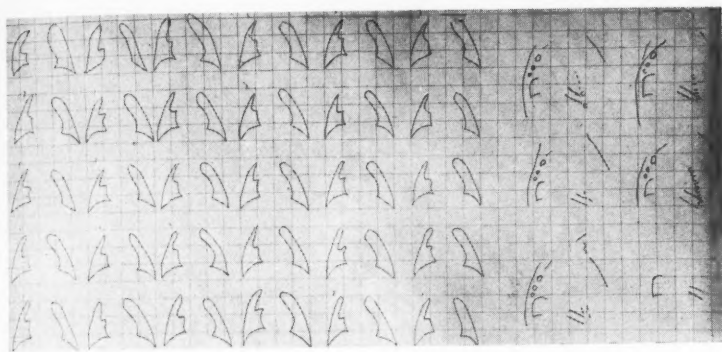


Fig. 9. A series of tracings of one case in both the lateral and anteroposterior positions. The constant deformity of the right cardiac and mediastinal outline represents, we believe, an enlarged thymic gland. (These films were made when the child was eight days old. There were no cardiac symptoms.)

venæ cavæ; the motions of the thoracic cage and diaphragm (following a cycle entirely independent from that of the heart and large blood vessels); the emotional state of the patient, and, finally, his position in relation to the radiographic equipment and gravitation. Carefully analyzing a large number of serial roentgenograms recorded with the Cinex-Camera on infants and children, Dr. Hasley and Dr. De Tomasi have come to the conclusion that the roentgenologist may diagnose thymic enlargement only when widening of the upper mediastinal shadows persists independently of the cardiovascular and respiratory cycles and uninfluenced by emotion and posture; furthermore, of course, when displacement and compression of other mediastinal organs, especially the trachea, may be demonstrated. In considering the huge functional amplitudes of the mediastinal shadows under the influence of the factors mentioned above, they have been able in a considerable number of cases to rule out thymic pathology, disprove the supposed influence of radiation treatment upon

#### (D)—MOTOR PHENOMENA IN THE URINARY TRACT

*Experiments carried on with several members of the Urologic Department, especially with Dr. R. E. Cumming*

Whenever a tubular viscus is rendered radiovisible one should study its function as well as its anatomic structure, since the evaluation of its physiologic behavior must be considered as equally important as—possibly even superior to—anatomic information. The omission of such observations will be regarded as negligence in medical practice of the future. Reporting on our attempts at investigation of the urinary tract we want sincerely to compliment Dr. Legueu, Dr. Fey, and Dr. Truchot, of Paris, and Dr. Manges, Dr. P. S. Pelouze, and Dr. H. R. Loux, of Philadelphia, who for years advocated such studies and whose work cannot be overestimated. The book "La Pyeloscopie," by the French group, must be regarded as a most masterly and instructive monograph on a physiologic problem.

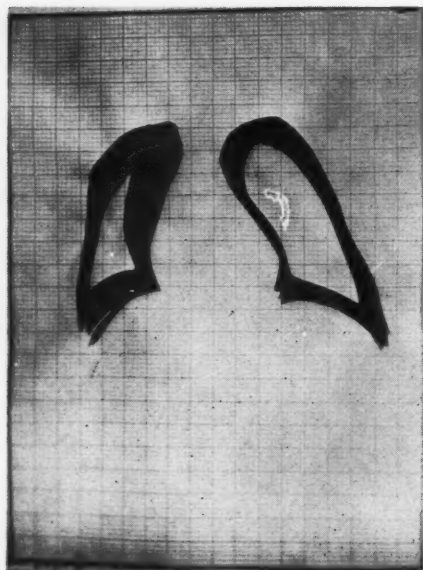


Fig. 10. Silhouette representing a composite tracing of about a hundred X-ray films. Note the difference and degree of movement. This case presents the clinical symptoms of an enlarged thymus. It is very probable that some of the symptoms are cardiac in origin.

A few technical remarks will not be out of place. A ureteral catheter is inserted, preferably into the kidney pelvis, its position in relation to the kidney and correct placing of the patient on the Cinex-Camera table being ascertained fluoroscopically. One exposure is made before the injection. Following this, pyelographic fluid is introduced under fluoroscopic control to a point where satisfactory filling of the pelvis and its calices may be noticed. Over-distention should be avoided by all means. The catheter is withdrawn immediately and without delay ten to twelve exposures are made, requiring a total of approximately fifteen to twenty seconds. These exposures will record the function of the kidney pelvis and the ureters and show at least one peristaltic wave passing along the entire urinary tract. Then further exposures are made thirty to one hundred twenty seconds apart until twenty feet of film have been completed, or, as ob-

served fluoroscopically, complete emptying of the kidney pelvis is recorded. We possibly may alter our technic somewhat in the future, especially if we can arrange for one of our cameras to be mounted in a motor-driven tilting table. We employ a motor-driven revolving Akerlund diaphragm which eliminates the necessity of winding and discharging the Bucky diaphragm for each exposure. The total of our exposures usually remains around or even below one-quarter of an erythema dose.

With our limited experience, gained during the last nine months, we have observed:

(1) In normal cases a kind of a milking action, starting in the minor calices and progressing through the kidney pelvis and the entire ureter to the bladder. Such a wave is halted for a short period in two places at the uretero-pelvic junction, permitting of the formation of the so-called ureteral bulb; furthermore, it results in an interesting play of alternating contraction and distention between the calices and kidney pelvis. Each calyx may function individually and independently from the others. The ureter can undergo remarkable distention, lateral and probably also longitudinal excursion, with or without kinking caused by such action and in combination with respiration.

(2) As the result of infection we have found complete inhibition of such functional phenomena, with insufficiency of the sphincters in cases without evidence of anatomic disfiguration. We also have seen marked architectural pathology with surprising preservation of function. The contrast between such observations must be of marked therapeutic and prognostic importance. A longstanding, advanced pyonephrosis is practically functionless, of course, similar to the longstanding infected bronchiectasis.

A tumor, besides creating marked and easily recognized structural changes, unmistakably permitting of its diagnosis, results in markedly impaired motility of the area

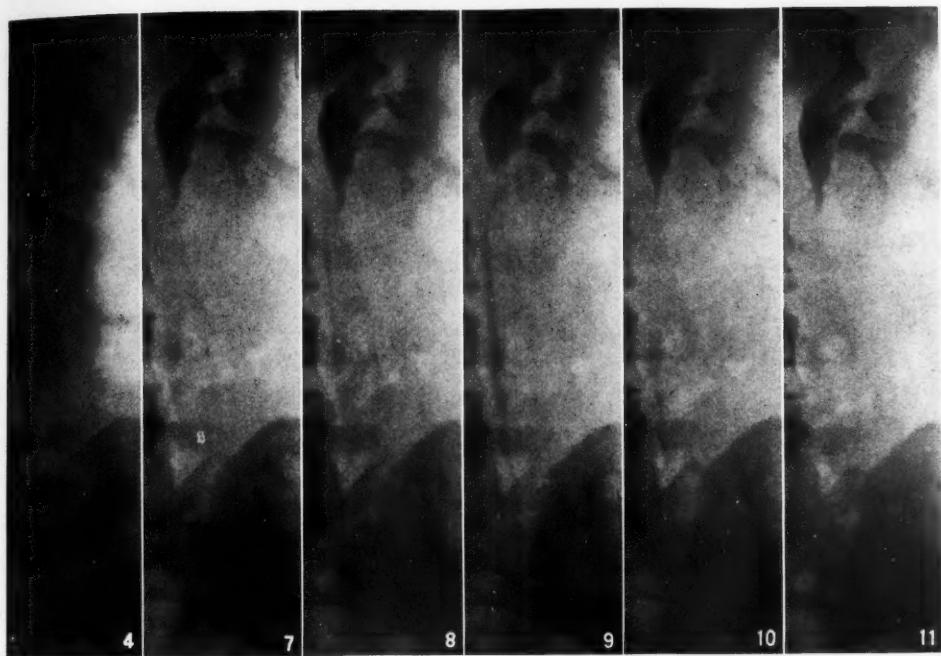


Fig. 11. Serial pyelo-ureterography; entirely normal motor function. (Observe especially, formation and disappearance of ureteral bulb and contractions of individual calices.) (Six characteristic sections from a long Cinex film.)

involved. Our hope, however, is to possibly detect a tumor long before it causes visible structural changes just by and on account of its interference with normal function in a rather small, localized area.

Reminding you merely of a few of the more acute but rather important practical questions to be solved in the field of urology, for instance, those of ptosis, mild hydro- and pyonephrosis, temporary stasis, hypertony and atony, kinks and strictures, results of plastic surgery, etc., which we hope to bring nearer their solution with this method of investigation, we feel that our enthusiasm in regard to the procedure is justified.<sup>4</sup>

<sup>4</sup>A report on similar studies with "Uroselectan" will appear soon in the *American Journal of Urology*; this paper was also prepared in co-operation with Dr. R. E. Cumming.

#### MOTOR PHENOMENA IN THE TRACHEO-BRONCHIAL TREE

(Experiments with Dr. W. A. Hudson)

With opaque oil introduced into the bronchi and serial roentgenograms made at speeds varying between one and four exposures per second, the following functional observations may be made during respiration:

(1) The changes in the position of the diaphragm, the position and relationship of the ribs, the cardiac and mediastinal cycles are readily recorded.

(2) The tracheobronchial tree is shifting in a proximal-distal direction during inspiration and in the opposite direction during expiration. This shift is over a distance of at least one-half inch as determined by

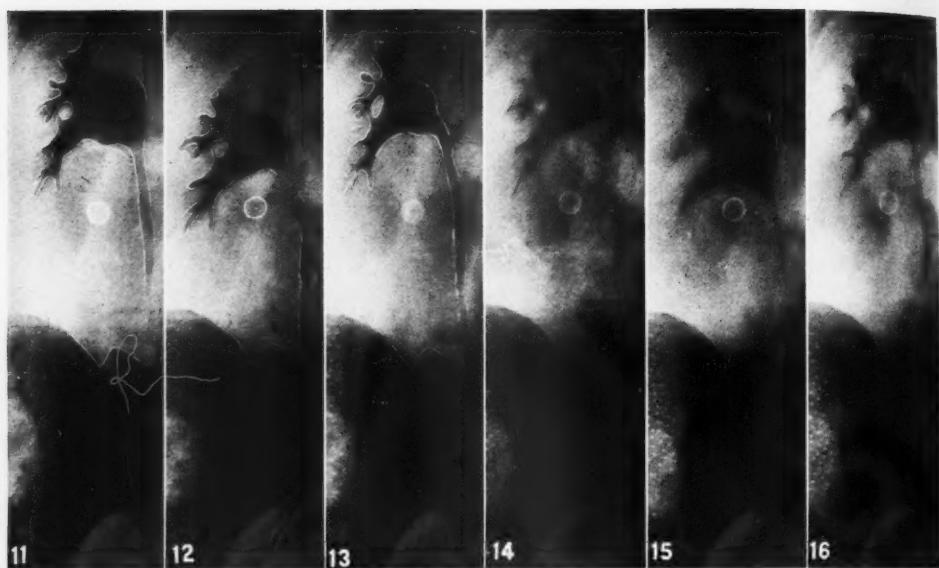


Fig. 12. Serial pyelo-ureterography; low-grade infection, with moderate retention in extrarenal pelvis—potential pyonephrosis. No formation of ureteral bulb, limited contractility of infundibula and calices, patency of ureteral sphincters, good remaining elasticity and contractility of renal pelvis and ureter. (Six sections from the original Cinex film of twenty views.)

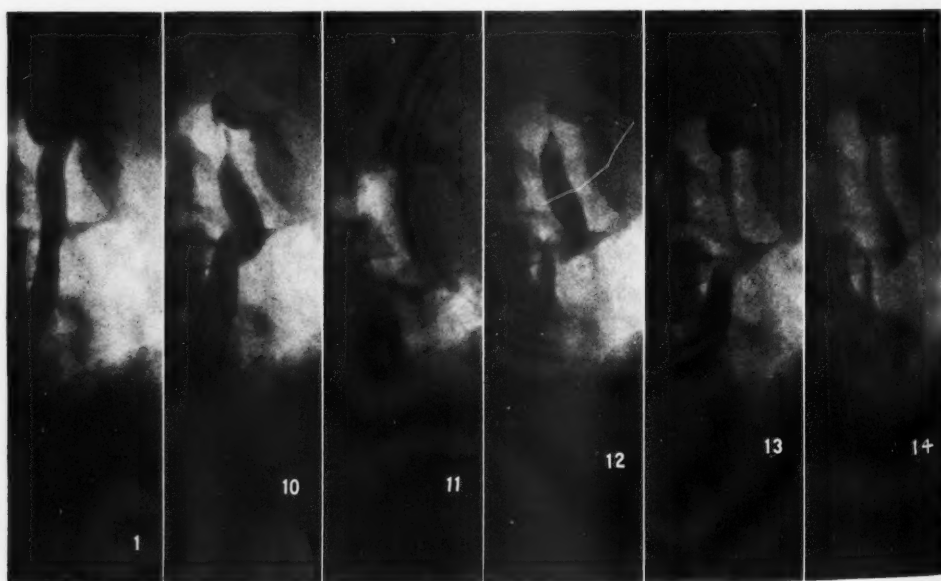


Fig. 13. Serial pyelo-ureterography; chronic periureteritis involving lower third of ureter, which is rigid. Violent obstruction peristalsis of distended upper two-thirds of ureter, partly futile.

measurements taken between the last cervical vertebra and a point in the upper portion of the bronchial tree of the lower lobe.

of the lung. This rotation, which may be best studied in the lower lobes by the appearance and disappearance of certain bron-

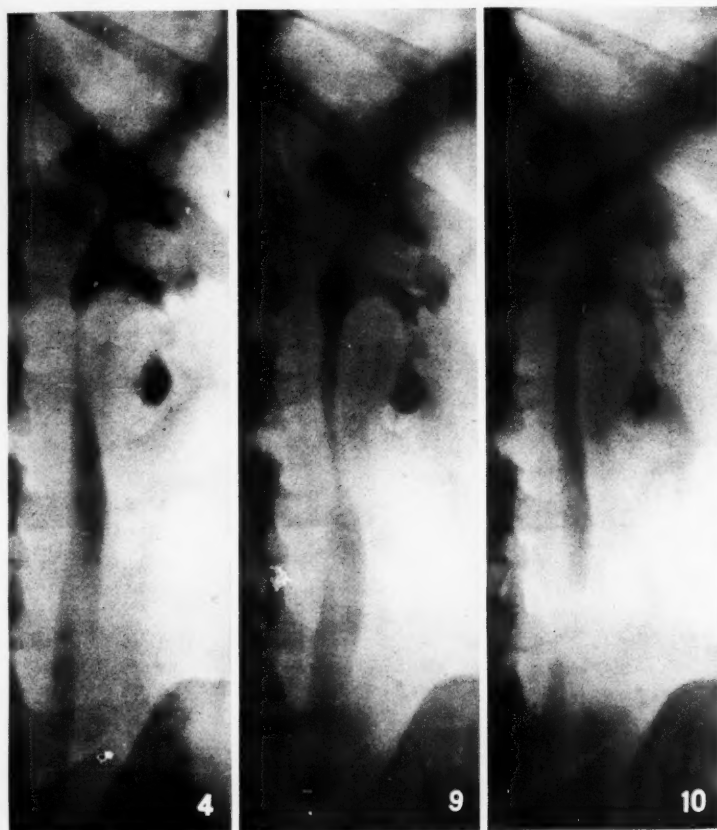


Fig. 14. Serial pyelo-ureterography; result of chronic low-grade pyelo-ureteral infection and periureteritis. Observe especially delay in emptying of entire system, under mild type of ineffective obstruction-peristalsis, filling defect in elongated lower infundibulum, blunting and complete rigidity of lower calyx. (History of intermittent bleeding from this kidney for five years, suspected tumor in lower pole, encroaching upon infundibulum; at operation and on histologic examination of two sections only evidence of results of chronic infection with moderate sclerosis was found.) Only three of twenty sections reproduced.

The excursion is at least three times as great for points in the most dependent portions of the same lobe.

(3) This shifting of the bronchial tree is intimately associated with a rotation movement of the lung and thus plays a large part in providing space for the expansion

chi from the line of vision, is seen to be from the back to the front during inspiration, associated with a definite element of descent, so that this movement of any given point strikes a course similar to a cork-screw turn.

(4) An alteration of the angles of di-

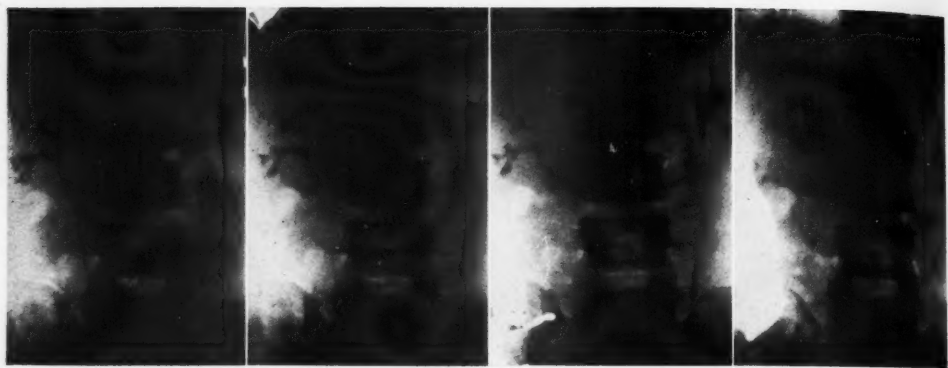


Fig. 15. Serial pyelo-ureterography; results of chronic infection and bilateral nephropexy. Contracted pelvises, loss of ureteral bulb formation; precocious emptying (three-quarters of a minute), persistence of linear filling defect at right uretero-pelvic junction (persistent accessory artery?).

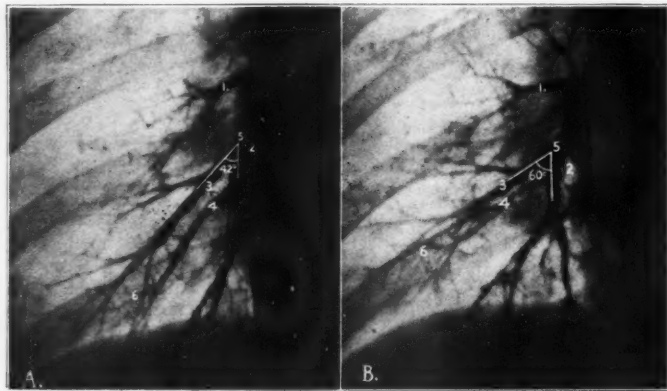


Fig. 16. Normal right lower bronchus, mapped out by iodized oil, showing two extreme phases of one respiratory cycle, (A) indicating deep inspiration and (B) complete expiration. The following should be noted: (1) difference in size and shape of the marked bronchus; (2) effect of rotation on relationship of bronchi; (3 and 4) approximation of the marked bronchi and differences in width and shape; (5) angle changes from 42 to 60 degrees, and (6) separation and overlapping of the terminal bronchi during different phases of respiration.

verging bronchi of the lower lobe is quite evident. During inspiration the angles become smaller, that is, of a more acute nature; during expiration they become greater. We have seen angle changes from 41 to 81 degrees. Rotation is in part responsible, without doubt, for this appearance and alteration of angles, but inasmuch as uniform alterations of these angles in all parts of the field are always observed, we feel that

rotation alone cannot be sufficient to account for such changes.

(5) Approximation and separation of bronchi, particularly those near the diaphragm, may readily be seen with respiration—movements which very closely simulate the opening and closing of a fan.

(6) When cough is elicited, whether suppressed or frank, bronchial contents of liquid consistency can be forced into the al-

veoli through the sphincters connecting the bronchioli respiratorii to the atria and the ductuli alveolares to the alveoli.

the structure of the organs we are dealing with, and the small size of their lumina, the somewhat unimpressive appearing amplitude

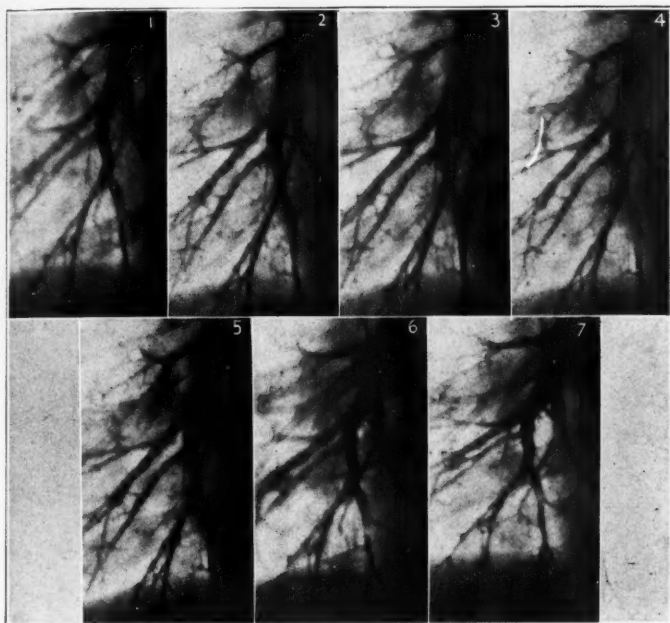


Fig. 17. Demonstration of the functional behavior of a normal right lower bronchus (filled with iodized oil) during one respiratory cycle. (Sections from a film band 8 inches by 20 feet obtained with the Cinex-Camera.)

(7) Peristaltic waves synchronized with the expiratory phase of respiration are found originating in the peripheral portions of the bronchial tree and progressing gradually towards the stem bronchi and trachea. These waves propel the liquid contents along their routes and evidently are able to empty the bronchial tree without invoking ciliary motion. They can be observed with such regularity and in such a rhythmical manner that it is difficult to question their existence. They are not found in all bronchi simultaneously, probably because with our subjects at rest only a few pulmonary elements were engaged in gaseous metabolism, leaving a large reserve for periods of increased demand. In consideration of

of these waves must not mislead you to underestimate their importance and efficiency.

During the last year we have also succeeded in demonstrating pathologic bronchial function in four different types of disease:

(1) In several cases of essential pulmonary asthma we found varying degrees of generalized and localized bronchial spasticity. Peristaltic contractions in these cases were evident and very effective in propelling opaque contents towards the trachea. These spasms were partly so pronounced that segmentation and at least temporary occlusion of bronchi resulted. In these patients the bronchial sphincters mentioned above showed such spasticity that no opaque medi-

um was permitted to enter the alveoli, even with cough.

In one asthmatic patient we observed to

tion (pneumonitis) we observed marked inefficiency of bronchial contractions and absence of progressing peristalsis. We believe

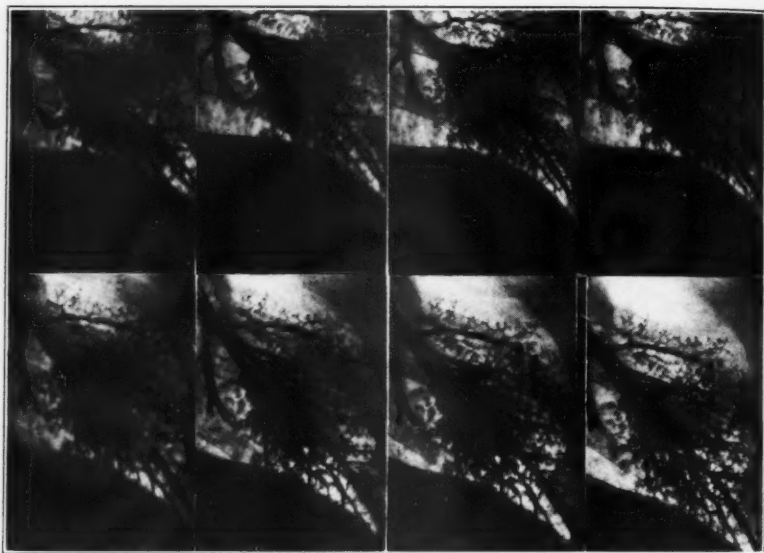


Fig. 18. The functional behavior of an emphysematic bronchus during respiration. (Sections from a Cinex-Camera film band.)

our greatest astonishment a faulty timing of bronchial peristalsis: progressive contractions occurred regularly during the inspiratory—not as in all other patients during the expiratory—phase of respiration. Such an observation to our knowledge never has been made before and must necessarily lead to a revision of our conception of asthma, at least for a certain group of individuals so afflicted. Adrenalin did not change this interesting dysfunction.

(2) In pulmonary emphysema a varying degree of atonicity of the bronchi was observed, so that the sphincters were easily forced and the bronchial contents readily entered the alveoli to a very marked extent, without any coughing reflex. Bronchial peristalsis in such cases may be observed quite well but it is not so efficient in propelling contents orally.

(3) Following severe bronchial infec-

tion that in all probability these changes were the result of inhibition or destruction of muscle function, while the contractility of the elastic fibers persisted and had survived the infection.

(4) In cylindrical bronchiectasis we found complete absence of all peristaltic motion and elasticity, so that such an ectatic bronchus exactly resembles a rigid pipe.

Reviewing the results of our observations, which cover a rather brief period of time, and considering the numerous chemical, physical, and nervous influences which might alter bronchial and pulmonary function, one cannot help being impressed with the value of functional investigations, and expect from them extremely helpful diagnostic as well as therapeutic information in the future.

Anticipating your criticism, we have to state that we are well aware of possibly

great differences in the action of the bronchi on gaseous and different kinds of liquid contents. Furthermore, certain terms,

looked and data of importance are accumulating fast. Some day it will be the task of one of our leaders to collect all these ob-

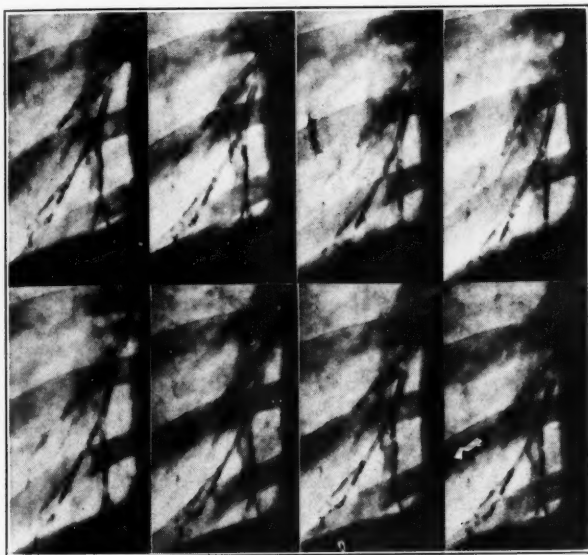


Fig. 19. Functional behavior of a spastic bronchus during one respiratory cycle. Girl 21 years old; typical attacks of asthma. (Sections from a Cinex-Camera film band.)

which we have used, may not appeal to you or seem quite justified in this connection as they are borrowed from certain other better known phenomena. The facts presented, however, we hope you will acknowledge, recognizing that this is only the first step into unknown territory and that I am not a professional but a rather young amateur in the field of physiology.

#### CONCLUSION

Physiology has been a stepchild in our roentgenologic laboratories. Very much in contrast to our advanced knowledge on roentgen-anatomy efforts to collect information on physiology roentgenologically have been badly neglected. However, the desire towards a better understanding of those functional phenomena which may be demonstrated roentgenologically cannot be over-

servations known at present and to be expected in the future and to publish the first broad survey in a text-book on "Physiology Roentgenologically Considered." Such a book will probably begin with a chapter on the function of the supporting and kinetic structures of the human body. It may continue with a discussion on the physiology of the systems of assimilation and elimination. It will contain a long chapter about the function of the cardiovascular system, and in all probability will demonstrate that the blood vessels, which at the present time we are inclined to regard merely as elastic conduits for the blood which is propelled along their route by the contractions of the heart, are in reality a system of equal—possibly even greater—functional importance than the heart muscle itself for the propulsion of the blood and the proper supply of this fluid to all organs, especially at periods

of demand, thus returning to pre-Harvey conceptions with certain modifications. It may not sound illogical to assume that the

cinating as it is to the dreamer of to-day, at present unfortunately is nothing but a fantasy. However, I hope that our contri-

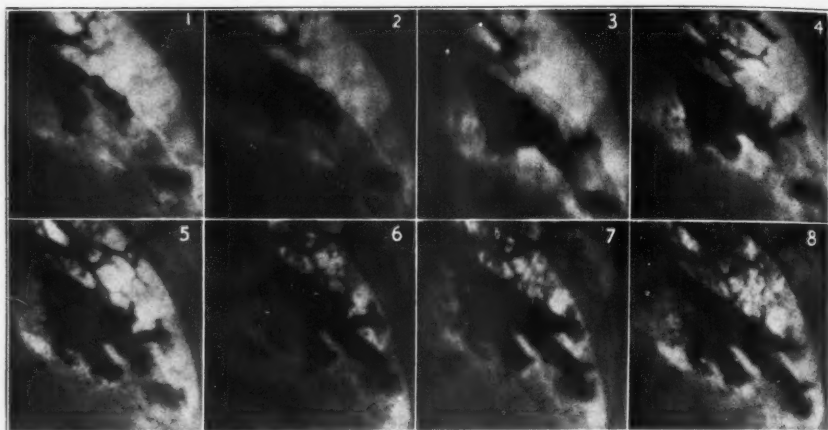


Fig. 20. Demonstration of the functional behavior of an ectatic bronchus during respiration and gradual influx of iodized oil. (Sections from a film band 8 inches by 20 feet obtained with the Cinex-Camera.)

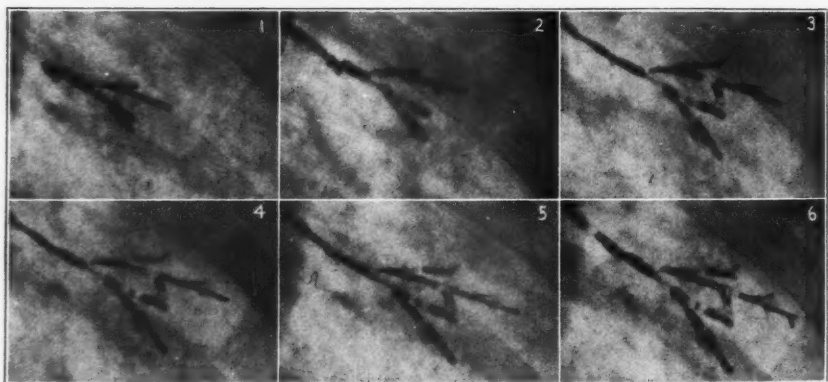


Fig. 21. Demonstration of the functional behavior of an asthmatic-spastic bronchus during respiration and gradual influx of iodized oil. (Sections from a film band 8 inches by 20 feet obtained with the Cinex-Camera.)

tegument of our body and some of the parenchymal organs will in time yield functional information under roentgenologic exploration and find a place in this book of the future. The work ahead of all of us thus resembles a vast uncharted ocean of which we now know only a few occasional soundings.

Such a prophetic outlook, extremely fas-

bution, the construction of the Cinex-Camera and the presentation of this paper, will be to you as stated at the outset—a stimulation to interest yourselves in physiologic problems, to visualize their importance. When you resume work remember this thought: Apparent anatomic normalcy is not of necessity associated with normal function; pathologic function does not neces-

situate demonstrable anatomic alteration; therefore we must bend our efforts to the investigation of anatomy and physiology, wherever the occasion arises, and information of incalculable value is to be obtained.

To the Director of the Grace Hospital, Dr. W. L. Babcock, the Board of Trustees and its President, Mr. William T. Barbour, I express my appreciation for material help with these investigations.

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## DISCUSSION

DR. W. W. WASSON (Denver): Of course I have had no experience with such a motion picture apparatus and do not wish to try to contribute anything to this presentation. Rather, I would like to speak in terms of commendation of this beautiful piece of work. As an advocate of the study of physiology by the radiograph and by serial radiographs I feel that I can see many things that we can look forward to from such

work. I think it will contribute especially to our knowledge of physiology of the body, which must be a basis for our pathology. We are too apt to take many things for granted in the practice of medicine. We take gross pathology and try to build up our knowledge of the body from the gross pathology, rather than by starting with the physiology. The work that has been done upon such apparatus in the past has been incomplete. I only hope that Dr. Jarre will be able to continue with this development, and if he does I feel it will be epoch-making and that it will contribute greatly to our knowledge.

DR. JOHN T. FARRELL, JR. (Philadelphia): As Dr. Wasson has said, we as roentgenologists have largely confined our studies to morbid anatomical processes. We seek to translate shadows into terms of gross pathological change; and we have neglected physiology. Any of you who has seen the bronchi lengthen and shorten with the motion of the diaphragm and the contraction of the chest has undoubtedly been greatly impressed.

In pyeloscopy, as we practise it at the Jefferson, we study the physiological processes, the filling time and the peristaltic action of emptying and filling of the pelvis; we get a great deal of information which we could not get if we confined ourselves to the radiographs. This study, as far as the fluoroscope is concerned, is a study of the motion of the organ; and I think that Dr. Jarre, in pointing this out, directs us to a new application of roentgenology; namely, a study of the physiology as well as the morbid anatomy.

DR. J. D. CAMP (Rochester, Minn.): I think Dr. Jarre's apparatus, besides opening up the X-ray investigation of the physiology of structures, has a practical application in

any clinic where one has to make a large number of films of individuals coming in for specific examinations. It will save a large number of intensifying screens, and the labor of reloading them. The roll films can be developed easily.

I would like to have Dr. Jarre tell us the average life of the screens used in this device. I understand that the screens are compressed and then separated.

There is a particular point which I think Dr. Jarre has not brought out and on which the film manufacturers will perhaps help us, and that is the use of the safety films. At the present time I understand that the safety film buckles and for this reason it is impossible to use it in Dr. Jarre's apparatus.

DR. HARRY B. PODLASKY (Milwaukee, Wisc.): I counted fifteen exposures, I believe, in one of those urological series, and I wondered if that was the usual number or

what number could be used in an examination.

DR. JARRE (closing): The life of screens under the strenuous use to which they are subjected I am not able to determine as yet. I have used Patterson's screens, but their surface is rather easily abraded by the film band. I therefore changed to French screens, the surface of which is better protected and can be recoated easily. I have not used more than two pairs of screens during all these experiments. I am using the cellulose-nitrate films at the present time. The acetate films buckle, tear the screens easily, and also they tear easily themselves; they do not stand tension as the nitrate film does. I think that will be corrected.

So far as the number of exposures is concerned, we have not exceeded twenty exposures in studies of the urinary tract (equivalent to  $\frac{1}{3}$  S.F.D. on the average).

## THE EFFECTS OF LIGHT ON THE SKIN<sup>1</sup>

By HOWARD J. PARKHURST, M.D., TOLEDO, OHIO

THE rays of direct sunlight range from the infra-red, or heat rays, of long wave length, through the red, green, and violet of the visible spectrum to the chemically active ultra-violet rays, of shorter and shorter wave length, seldom less than 290 millimicrons (2,900 Ångström units), even on mountain tops. Artificially, the ultra-violet wave lengths can be brought down to 10 millimicrons, but for our consideration 220 millimicrons is the lowest wave length of importance, and the rays of about 300 millimicrons (3,000 Å.) are biologically the most active. Of course, there are more ultra-violet rays at high altitudes and less at lower levels. The strength of the sunlight also varies with atmospheric conditions, the time of the day, and the presence of reflecting media such as snow, ice, and water. It seems that the ultra-violet rays are chiefly responsible for damage to the skin, although in some isolated cases certain other spectral groups have a specific irritating action.

The normal skin is protected against such damage by the presence of pigment and by the secretions of the sebaceous and sweat glands, as well as by certain changes in the epidermal cells. The direct rays of the sunlight strike the nose, cheeks, the front of the chin, the dorsa of the hands, and the extensor rather than the flexor surfaces of the forearms. By reflection against ice, snow, or water, the under surface of the chin may also be affected.

### ACUTE EFFECTS OF LIGHT ON THE NORMAL SKIN

The normal skin "burns" when first exposed to intense sunlight. We are all familiar with sunburn and know that it is espe-

cially severe in a blonde skin and that certain persons are more susceptible than others. It is an erythema produced by the chemically active rays of the sunlight, especially the ultra-violet rays. Their action is said to liberate from the epidermal cells a substance resembling histamine, which produces a dilatation of the superficial capillaries of the exposed area and a zone immediately surrounding it.

### CHRONIC EFFECTS OF LIGHT ON THE NORMAL SKIN

More or less tanning usually follows a sunburn, especially if the skin is repeatedly exposed to sunlight. This tan varies in intensity with the climate and seasons, and in different races and individuals. Ultra-violet rays of 300 millimicrons (3,000 Å.) are said to be the most active in pigment-formation as well as in the production of erythema, but rays of longer wave lengths also form pigment and less erythema. The pigmentation is apparently due to the action of light on a pigment-forming ferment in the basal cells of the epidermis. It is usually diffuse, but in certain individuals, especially in red-haired blondes, it appears in the form of freckles. The tendency to freckle-formation seems to be hereditary. In such cases freckles are usually present between the ages of four and forty, but they have been seen occasionally in babies. In elderly persons pigmentary patches often appear, which are larger than ordinary freckles and represent a senile degeneration of the skin, probably due to years of exposure to light and other irritants.

As the skin becomes tanned and the exposure to sunlight is greatly prolonged, the horny layer becomes thickened and brownish, owing to changes in the other epidermal

<sup>1</sup>Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2-6, 1929.

cells, and the skin is then better able to resist other irritants as well as light. Especially in blondes, both male and female, notably in the latter, on the cheeks, front of the neck and dorsa of the hands, long exposure may be followed by the appearance of a chronic erythema, dryness, roughness, and telangiectasia. The accompanying vascular changes may predispose the affected areas to various dermatoses. After years of exposure connective tissue changes may appear, and a condition merging into senile degeneration.

#### THE ACTION OF LIGHT ON PATHOLOGICALLY LIGHT-SENSITIVE SKIN

Hydroa aestivale is a rare skin disease showing a distinct hereditary tendency, characterized by the appearance of large or small vesicles, often followed by varioliform scars, on the exposed parts, appearing chiefly in the warm seasons. It begins usually in the first year of life, often following the first intense sun exposure, and recurs annually throughout life. There is usually an increase in pigment and lanugo hair growth on the affected areas. In severe cases scarring may cause severe disfigurement, such as the loss of the tip of the nose or the finger tips. The nails may be disfigured or destroyed, and eye changes have been noted. The eruption is usually produced by ultraviolet, but sometimes by visible, rays.

There are three classes of patients with hydroa aestivale: First, those with congenital porphyria. These represent the most severe cases and often die at an early age. The porphyrin is a substance which, circulating in the blood stream, increases the sensitiveness of the skin to light. In these congenital cases the porphyria persists throughout life, and, with it, the appearance of the eruption on exposure to direct sunlight. The second class of patients present chronic porphyria which is not congeni-

tal. Their eruptions are usually not so severe. Liver insufficiency is said to account for their porphyria. Patients of the third class present no porphyria, and their eruptions are the least severe. In some cases, porphyria has been intermittent, and it has been present in some cases with a normal skin and no light susceptibility.

The eruption of hydroa aestivale is readily differentiated from erythema multiforme, bullous, dermatitis herpetiformis, the rare epidermolysis bullosa hereditaria, and vesicular eczema. Aside from the exclusion of light, no effective treatment has been devised.

*The chronic polymorphous eruption due to light*, often called the summer prurigo of Hutchinson, is a papular and eczematoid eruption on the face and the dorsa of the hands, recurring in the warm seasons over a period of years, and absent or less pronounced in the cooler seasons. Some observers consider it to be a mild form of hydroa aestivale. Although rare, it occurs much more frequently than hydroa aestivale. It has a predilection for a blonde skin and for females. A hereditary disposition has often been observed. Most cases have their onset in childhood, usually later than hydroa aestivale, and many of them clear up at puberty. Some, however, start about puberty and continue until the age of thirty or forty. The eczematous elements usually predominate on the face, and the papules on the hands, although the two are seldom unmixed. Itching is a prominent symptom. There is often an associated conjunctivitis, swelling and fissures of the lips, and enlargement of the regional lymph nodes. No porphyrinogen nor uroporphyrin has been found in the urine, and no coproporphyrin in the feces. Changes have been found in the serum, but the etiology of the condition has not been revealed.

Pellagra is an affection of the digestive tract, central nervous system, and skin, oc-

TABLE I  
CASES OF CHRONIC POLYMORPHOUS ERUPTION DUE TO LIGHT, SEEN IN THE  
AUTHOR'S PRACTICE

Case	Sex	Occupation	Age	Complexion	Duration	Other Cases in Family	Eruption	Porphyrin	Remarks
1	F	Waitress	38	Light	9 years	Three sisters (not seen)	Itching patches, eczematoid, papular and slightly vesicular. On face and hands in summer only.	None	Aggravated before menstruation and by exposure to heat or wool. Produced by summer sun—even by light through window-glass.
2	F	Housewife	28	Light	14 years	Twin sister (Case 3)	Itching patches, eczematoid, papular and slightly vesicular. On face, upper chest, and hands in summer only.	None	Areas on leg reacted violently after short exposures to Kromayer lamp.
3	F	Housewife	28	Light	19 years	Twin sister (Case 2)	Same as Case 2, but including forearms and lips. Present all summer, but always some erythema of face.	Slight trace	Tested with short Kromayer exposures and reacted violently.
4	M	Riveter	37	Medium	2 years	None found	Ill-defined itching; papular and eczematoid patches on face and neck, and slightly on dorsa of hands, in summer.	None	Mild case, brought out by exposure to intense sunlight on water. Gloves worn at work partly protected hands.
5	M	Salesman	49	Light	20 years	None found	Same as Case 4, on nose, cheeks, front of neck, and dorsa of hands, in summer.	None	
6	F	Building contractor	42	Light	11 years	None found	Faint erythema and many urticarial papules on arms and upper midchest, from March to October 1st (temperate zone), in sunlight.	None	Mild summer prurigo, not urticaria. Face not affected, possibly protected sufficiently by cosmetics.

curring especially in Italy, Spain, Egypt, and the southern United States. It attacks all ages and both sexes equally, and is found chiefly among the poorer classes and in institutions. The eruption occurs mostly in the summer, on the exposed parts of the body, after exposure to direct sunlight. It appears with erythema, some edema, and occasionally vesicles, followed by scaling, hyperkeratosis, pigmentation, and sometimes slight cutaneous atrophy. The eruption is characterized by a sharp line of upper demarkation on the forearms, resembling a gauntlet. The outbreaks may last several days or many weeks, and may recur several times each year. They sometimes occur in the fall rather than in the summer. Accompanying eruptions often appear on the elbows, arms, axillæ, genitalia, and perineum, and at the same time certain parts which are exposed to the light may not present the eruption. Pigmentation seems to offer no protection, for the skin lesions appear in negroes. The tongue usually presents a beefy, denuded appearance, which is of diagnostic importance. The chief symptoms are "*the three D's*,"—dermatitis, diarrhea, and dementia. A poorly balanced diet seems to be an important etiologic factor, and when this is corrected improvement usually ensues.

Pellagroid eruptions (resembling pellagra) are often seen in localities where true pellagra is very rare. They occur chiefly in alcoholic or cachectic individuals, and a defective diet is an important factor here also. Since the maize theory of pellagra etiology is being largely abandoned, these cases may be examples of true pellagra, for they present all of the characteristic symptoms. In my practice I have encountered two such cases, in poorly nourished persons of middle age, who had never visited the South nor lived on maize, but who had been forced by poverty to exist on a greatly restricted and ill-balanced diet. Both cases presented the characteristic picture of pellagra.

An Italian observer has reported a case in which a pruritic, infiltrated, vesicular dermatitis appeared *on the exposed parts at each menstrual period*. The ultra-violet rays seemed to be responsible. The outbreaks faded after roentgen-ray treatment of the ovaries. I have seen three cases which seemed to be at least partly of this type. Case 1, in Table I, presented an aggravation of the summer prurigo eruption just before the onset of each period of menstruation. In two other cases, which I have classified as dermatitis dysmenorrhoeica, erythematous and vesicular patches, appearing at each menstrual period, associated with dysmenorrhea, were limited to the areas exposed to sunlight. This distribution may have been a coincidence, but it is possible that the irritation of direct sunlight precipitated the eruption.

External applications, especially tar, may sensitize the skin to light, at least temporarily. Several years ago I saw a paving contractor, aged 47, who had been exposed to tar and sunlight while directing road work. His face and neck showed much telangiectasia and erythema, and numerous milium papules. A protective ointment was used, and the eruption subsided. A man, aged 64, was referred to me on account of multiple keratoses of the nose and dorsa of the hands, of two years' duration. This patient had directed asphalt paving jobs for a number of years, and his exposure to tar and sunlight seemed to have been a factor in the formation of the keratoses, which were not of the ordinary senile type. Tar products, especially when employed in outdoor work, seem to constitute an industrial hazard.

Eosin and other fluorescent substances, given internally, have produced light sensitization. Acridine derivatives, such as tryptophan and gonacrin, used in the treatment of gonorrhea, were found to produce light sensitization in one-third of the patients

treated, especially pronounced in April, May, and June. The erythema was followed by pigmentation. Resorcin was administered to counteract this condition.

The administration of luminal has been known to produce an eruption resembling hydroa aestivale, with porphyrinuria. Trional has sometimes produced a pellagroid eruption.

Domestic animals which have eaten buckwheat develop a dermatitis of the white (non-pigmented) areas of their coats when exposed to direct sunlight. This sensitization persists for three or four weeks. Buckwheat does not seem to produce these eruptions in man, possibly due to changes during the process of cooking.

Xeroderma pigmentosum is a rare condition in which the exposed parts of the skin become senile during the patient's childhood. It occurs in all races and climates, especially in blondes. It is distinctly a familial condition, often seen in brothers and sisters and less frequently in direct descendants. It commonly begins before the third year of life, and usually in the first year, and customarily proceeds through four stages, which overlap. First there is an erythema, then pigmentary patches appear, followed by atrophy and telangiectasia, and finally by the formation of multiple keratoses and epitheliomas. The conjunctivæ and corneas are also involved. The condition progresses in the summer and remains nearly stationary in the winter. Most of these patients die before the age of twenty, but there are instances of coal miners and other workers who strictly avoided sunlight and thereby managed to survive.

Sailor's skin, well known to all of us, is a similar condition occurring after middle life, especially in those who have been much exposed to direct sunlight, and particularly in those who have been exposed to tar, as noted above. Years of exposure to the light may also be followed by degeneration of the elastic and collagenous tissues of the ex-

posed skin. This produces the familiar flaccid, yellowish, furrowed, wrinkled skin of the face seen in old age, and the rhomboidal furrows at the nape of the neck. There is a possibility that prolonged exposure to ultraviolet rays of artificial origin may ultimately produce similar changes in the skin, and this calls for discretion in the use of therapeutic lamps.

#### SKIN DISEASES AGGRAVATED BY LIGHT OR BROUGHT OUT BY LIGHT

Light acts as an irritant. It may thus aggravate some existing eruptions or bring out latent eruptions. Long exposure to light (as in the sternoclavicular triangle in women) may predispose to eruptions of the affected area.

Some observers have felt that sunlight aggravated the eruption of variola, but Schamberg and others deny this.

An inflammation of the lips, especially the lower lip, called "actinic cheilitis," with dryness, scaling, and fissuring, is commonly seen in the Rocky Mountain region following several days' exposure to the intense sunlight. The dust may be an additional irritating factor in these cases. Plain vaseline or bland ointments furnish suitable protection.

Outbreaks of herpes simplex often appear after exposure to intense sunlight. Irritation is thought to account for this.

Erythema multiforme, which is not ordinarily considered to be related to light exposure, usually occurs on the hands, neck, and face, and was found in Copenhagen to be most common between April and August, especially in June. Light may be the precipitating factor in many such cases.

Lupus erythematosus is a not uncommon skin disease, which usually appears on the nose and cheeks in erythematous patches, and occasionally follows a sunburn. In Copenhagen its commonest time of onset was found to be in April, May, and June,

especially the latter. During the last eight years in Toledo, I have seen 41 cases of lupus erythematosus, 5 of which had appeared directly following a severe sunburn. Occasionally the eruption may spread to covered parts of the skin, especially the arms. It may or may not flare up after subsequent sunburns.

Psoriasis is often benefited by ultra-violet exposures, but not always. In the past eight years I have treated 231 cases of psoriasis, 55 of which presented lesions on the hands and face. It is true that most of these patients were indoor workers, but I have observed an involvement of the exposed parts occasionally even in farmers. Light, as an irritant, may actually aggravate certain cases.

There have been recorded a few cases of urticaria due to light sensitization. In these cases wheals appeared on the areas of skin exposed to direct sunlight or ultra-violet, and sensitization to visible rays has also been reported.

Vitiligo is apparently made worse after exposure to sunlight, but this aggravation is more apparent than real. The depigmented patches cannot tan, and therefore they stand in marked contrast to the deepening tan of the surrounding normal skin.

Hair growth often seems to be favored and accelerated by exposure to ultra-violet

rays: this seems especially true of lanugo hair growth. But prolonged over-exposure to intense sunlight, as in the case of a life-guard at a bathing beach, may be followed by bleaching, dryness, and thinning of the hair.

#### TREATMENT

Nature protects most of us from the sun's rays by furnishing pigment and epidermal cell immunity. Clothing and window-glass offer further protection. Ointments, creams, liniments, lotions, and powders also furnish fairly effective coating for protection. The 4 per cent esculin-glycerin ointment devised by Freund is said to be valuable. Resorcin has been employed internally and in ointments. I have administered it by mouth (grains ij, 2xd.) and at the same time used it locally in a 2 per cent ointment, in cases of Hutchinson's prurigo, with no apparent benefit.

The general outline of this paper and much of the material was obtained from a very valuable German publication of recent date, "Lichterkrankungen der Haut," by Hausmann and Haxthausen (Urban and Schwarzenberg, publishers, Berlin and Vienna). These authors have done much authoritative work in this field, and the reader is referred to their book for further particulars.

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# EDITORIAL

M. J. HUBENY, M.D. . . . . *Editor*  
BENJAMIN H. ORNDORFF, M.D. . . . . *Associate Editor*

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## IMPOSITIONS ON RADIATION THERAPY

During the past fifteen years radiation therapy has come to occupy a very substantial position in the field of medicine, more particularly in the treatment of neoplastic diseases. Its indications and limitations are gradually being more clearly understood. However, there are still many instances in which the physical agents are placed at a disadvantage in a given case, or, in general, through improper handling, these agents are ultimately discredited.

It may be well to call attention to some of these facts in our efforts to bring about a clearer understanding amongst both surgeons and radiologists. While the group is, fortunately, lessening, it nevertheless still obtains that cases too far advanced for any form of active therapy are urged upon departments of radiology for treatment. This is unfortunate, to say the least, since simpler means are available for placebo treatment. Too often consultation with the radiologist is sought only after a preliminary operation has been done. It is quite possible that irradiation at an earlier stage might have been much more advantageous. At least it would seem logical that if irradiation preliminary to a second operation was considered advantageous, it might all the more be deemed advantageous as an initial complement to the first operative procedure.

If the operating surgeon is not personally

familiar with and well versed in the fundamentals of radiation, he should at least have consultation and advice on that point before proceeding with any form of treatment. The intimate relationship between operative surgery and radiology in the cancer field to-day has so modified many of the operative procedures that we might very well regard cancer surgery in general as a special field within itself and certainly so in conjunction with the use of the physical agents.

Too many cases are turned over to the radiologist after the surgeon has carried out the text-book procedure in the given case, to be carried on. This "carrying on" usually means some post-operative treatment which, in many instances, is of questionable value, plus assuming the responsibility for the patient's ultimate course. Such correlation between the two departments, while better than none, is nevertheless far too loose. It is true that during the revival of interest in cancer therapy during the past few years the radiologist has been most aggressive in cancer therapy, but some of this enthusiasm has been over-done and ill-advised to the detriment of his specialty.

Not infrequently we see attempts made at treatment by X-radiation alone of adult epidermoid carcinoma within the mouth. At the same time we see efforts made toward the treatment of metastatic cervical nodes of epidermoid carcinoma by small external applications of radium. Procedures such as these, and many other similar ones which might be cited, tend only to discredit these physical agents.

Plenty of information, physical, clinical, and histological, is available to-day to guide the radiologist within the reasonable limi-

tations of his work in technical matters of dosage and dosage intensity and in the selection of the agent best suited to accomplish the desired result, providing it falls within the limits which by experience and carefully controlled dosage measurements have been found to be feasible.

The time has fortunately passed when an X-ray exposure or a little bit of radium is tried in a given case in the hope that some favorable reaction will happen. Too much stress cannot be laid upon the necessity for close application to physical experience and particularly to physical data obtained from the experience with successfully treated cases.

In criticizing neglect of pre-operative irradiation on the part of the operating surgeon, it is only fair to call attention to the fact that preliminary irradiation is sometimes persisted in far too long by the radiologist. The fact that an initial regression, which is pleasing and reassuring to all, is brought about by the preliminary course of treatment, does not imply that repetition of these doses over a prolonged period of time will ultimately bring about a complete regression of the disease. The patient and his family not infrequently take this view of it, but the hopes of these unfortunate people should not be permitted to override better judgment. For that matter, the radiologist would do well, on general principles, to treat sympathetically but otherwise disregard the importunities of the patient and his relatives, who are either anxious to avoid an operative procedure or desirous of bringing about the impossible in the more advanced type of case. The final result, if one yields to such appeals, is usually an abundance of regret.

The tendency toward treatment of many tumors of unknown type and origin is regrettable. It is possible that the so-called "therapeutic test" may have some place in the field of radiology, but, if so, it is on a very narrow margin and should never be de-

liberately resorted to without serious preliminary consideration and after ample and adequate consultation. This does not mean that a biopsy must be done at all hazards, even at the expense of a major surgical procedure. Other clinical measures must be depended upon as well—and at times scientific accuracy may have to be sacrificed in the best interests of the individual case. There is a great tendency toward spreading radiation too thinly over a very wide field and this ought to be avoided most carefully.

Radiation has been a blessing indeed within the field of cancer therapy, both in the actual treatment of this group of diseases and by way of stimulating investigation in many directions, yet, it must not assume the rôle of a "cure-all." Efforts at accomplishing the impossible through the use of the physical agents only tend to discredit them in the end. Criticism and discredit of irradiation are brought about, and justly so, through many of the incomplete and overenthusiastic reports so frequently noted in the literature. Relief from symptoms does not necessarily mean eradication of the disease; surface healing is no assurance of cure.

Irradiation after one of the palliative operations such as gastro-enterostomy, colostomy, or cerebral decompression may be and often is credited with entirely too much in the immediate symptomatic improvement. Quite naturally nothing is gained and a great deal is lost to the field of radiology by claims of unearned benefits in such instances. Many patients experienced comparable relief after palliative procedures of this sort long before the physical agents were used in cancer therapy. Reports based on limited numbers of cases, particularly with very short observation periods, serve no good purpose, are usually directly harmful, and for the most part result only in discredit to the vast amount of good which is being accomplished now through the benefits of irradiation therapy.

For the ultimate good of the cause, the radiologist would do well to be very conservative in all reports relative to benefits derived through the employment of irradiation.

DOUGLAS QUICK, M.D.

## INVITATION TO RADIOLOGISTS

GARVAN EXPERIMENTAL  
LABORATORY

COPLEY SURGICAL PATHOLOGICAL  
LABORATORY OF THE JOHNS  
HOPKINS UNIVERSITY

*Johns Hopkins Hospital,  
Baltimore, Md.*

As one interested in radiology, you are cordially invited to come to Baltimore, Maryland, Monday, Tuesday, and Wednesday, September 15, 16, and 17, 1930, for a post-graduate teaching course, with lantern slides, on the diagnosis and treatment of diseases and tumors of bone.

You may extend this invitation to any member of the medical profession who is interested in the problem as a radiologist, pathologist, internist, or surgeon.

We are anxious that this invitation shall reach those members of the medical profession who see least of bone lesions and want help most in the diagnosis and methods of treatment.

The demonstrations will be held in the ballroom of the Belvedere Hotel, Charles and Chase Streets, Baltimore, Maryland. On account of the size of the ballroom the number is limited to eight hundred. If you desire to attend this demonstration, which begins Monday morning, September 15, at 10 o'clock,<sup>1</sup> write at once to the Manager of the Belvedere Hotel to reserve accommodations, and by so doing automatically register for the demonstration. It is requested that you specifically state whether you will

be there Monday, Tuesday, or Wednesday, or all three days.

The Manager of the Belvedere Hotel will be willing to give reduced rates to those who desire them. When writing, therefore, ask for the usual rates for single and double rooms, with and without bath; for special rates of three or more in a room, with and without bath, and for the special restaurant rates of club breakfast, luncheon, and dinner.

It is very important for you to keep the final letter from the Belvedere Hotel and present it when you register.

The demonstrations will take place from ten to twelve-thirty in the morning, two to four-thirty in the afternoon, and seven to nine-thirty in the evening.

The demonstration Monday will be devoted to the simplest fundamentals of the clinical picture, X-ray and gross and microscopic pathology of osteitis fibrosa, giant-cell tumor, osteomyelitis, exostosis, benign bone tumors, sarcoma, multiple myeloma, and metastatic tumors. Four lanterns and screens will be employed in the demonstration.

Tuesday will be devoted to the differential diagnosis of lesions of special bones—lower end of radius, upper end of humerus, vertebrae, etc.

Wednesday will be reserved for the presentation of rare and very difficult-to-diagnose lesions of bone.

Anyone planning to attend this meeting may at once register such a case or cases observed personally or by some colleague, addressing Miss Maude Walker, Secretary to Dr. Bloodgood, Surgical Pathological Laboratory, Johns Hopkins Hospital, Baltimore, Maryland. Accompanying this registration must be the X-ray films, or lantern slides, a brief clinical history, and, if an operation has been performed, sections of tissue.

If you cannot send lantern slides, we will make them ourselves from the X-ray films

<sup>1</sup>Daylight saving time.

and microscopic sections. With your permission, this case, after the meeting, will be registered with the Bone Sarcoma Committee of the American College of Surgeons, so that it always will be available for comparative study in this collection.

The studies of lesions of bone which have been going on actively in the Surgical Pathological Laboratory since 1920 demonstrate that the earlier individuals present themselves after an injury or any symptom referred to a bone, the more difficult is it to make a diagnosis from all the clinical and laboratory data and the X-rays; and even more difficult is it to be certain of the diagnosis when a biopsy has been performed in the attempt to solve the problem and institute treatment.

In published communications from this laboratory since 1921, we have gradually formed a working rule which to-day is not yet universally accepted or followed. The failure to follow it explains many of the mistakes and the ultimate failure of treatment whether irradiation or operation. Lives or limbs may be lost because these simple rules, which any one can follow, are neglected in haste or curiosity to do something quickly.

When an X-ray film is taken of a lesion of a bone and there remains any doubt whatever as to the nature of the trouble, from the X-ray film itself, the following should be done at once:

Take X-ray films of the opposite bone, of the pelvis, chest, the teeth, and a lateral view of the skull. Examine the urine for Bence-Jones bodies. Take the blood Wassermann reaction. Count the blood with a differential white count. Take the rectal temperature for a few days. While waiting, it is always beneficial to keep the affected part at rest by putting the patient to bed or using crutches to relieve a lower limb, or a sling to support an upper limb. If there is a deep X-ray apparatus available, give irradiations. No lesion of bone is ever harmed by prop-

er irradiation. If the blood Wassermann is positive or doubtful, immediately start intravenous treatment and observe the result.

In cases of this kind, if the diagnosis is still in doubt, it is better to submit the history and the X-ray film to one or more of your experienced colleagues before considering biopsy.

As a matter of fact, the microscopic diagnosis from fresh sections at the operation, or permanent sections later, may prove even more difficult than the interpretation of the X-ray film itself.

These difficult-to-diagnose lesions of bone are on the increase, even in the clinics of the more experienced radiologists and surgical pathologists. More and more members of the medical profession should avail themselves of the opportunities for studying bone lesions by writing Dr. Bowman C. Crowell, Director of Clinical Research and Chairman of the Committee on Bone Sarcoma of the American College of Surgeons, 40 East Erie Street, Chicago, Illinois.

It is my hope that this demonstration in Baltimore on a large scale will be helpful to those who need it and want it most.

It is suggested that members of the Radiological Society who plan to attend the meeting in Los Angeles in December and who have rare and interesting cases to register, hold them for that meeting and register them with Miss Maude Walker, October 1, as the writer has been invited to direct a lantern-slide demonstration of this character before the meeting of the Radiological Society of North America in Los Angeles.

Those who are not subscribers to RADIOLOGY are urged to write J. R. Bruce, Business Manager, 2429 University Avenue, Saint Paul, Minnesota, and inquire about the enlarged journal, RADIOLOGY, made possible by financial aid of the Chemical Foundation of New York. I take this opportunity to urge every member of the medical profession interested in lesions of bone and the entire cancer problem to subscribe to

RADIOLOGY and the new *American Journal of Cancer* to be issued in January, 1931. When every member of the medical profession, ambitious to keep abreast with the fundamental and new knowledge of radiology and cancer, subscribes for these two journals, it is quite possible, according to William W. Buffum, Manager of the Chemical Foundation of New York, that a special combination subscription rate may be made that will be unusually attractive to those interested.

A library of the best journals and the attendance at real post-graduate teaching demonstrations are becoming more and more essential to the successful practice of medicine among enlightened people.

The meeting of the surgical pathologists in the Surgical Pathological Laboratory of Johns Hopkins Hospital in June of this year demonstrated that there are many members of the medical profession to-day who want better opportunities to improve their microscopic diagnosis. For two days fifty-five pathologists studied sections of difficult cases and registered their diagnoses and opinions in writing. On not a single difficult case was there full agreement, but on all cases the majority was right, while the result of a similar demonstration fifteen years ago was the reverse. The majority then was wrong.

As radiologists let us make a prompt study of how we can most rapidly improve our ability to read X-ray films with greater accuracy.

There will be no expense to those attending this post-graduate course, except transportation and living expenses, and the Belvedere Hotel will attempt to make it possible for anyone to attend. The other expenses will be borne by the Garvan, Copley, and Bloodgood Cancer Research Funds. Should the attendance be far in excess of eight hundred, and there is time, a larger hall will be engaged. Should the number of cases registered be greater than can be taken

care of Wednesday, the meeting will continue over Thursday, September 18.

I would urge all radiologists to register all bone tumors they have treated by irradiation, the results of which are known to them, with Dr. B. C. Crowell, American College of Surgeons, 40 East Erie St., Chicago, Illinois, sending X-ray films (beginning and end of treatment), and clinical notes: also, to register all cases of multiple myeloma and metastatic hypernephroma which have been under their X-ray observation. All these data will allow a very comprehensive study of these groups next year or this Fall.

Please see that this letter, or a copy of it, is posted up in your hospital, so that all the staff may see it, and, if convenient, have it read before the first available meeting of your City or County Medical Society.

Sincerely yours,

JOSEPH COLT BLOODGOOD, M.D.

## ANNUAL MEETING, LOS ANGELES, CALIFORNIA

December 1-5, 1930

### LOCAL COMMITTEES

#### Executive:

ALBERT SOILAND, M.D.  
WILLIAM E. COSTOLOV, M.D.  
ORVILLE N. MELAND, M.D.

#### Entertainment:

WILLIAM B. BOWMAN, M.D.  
PAUL B. ROEN, M.D.  
J. W. CROSSAN, M.D.

#### Outdoor Sports:

F. H. RODENBAUGH, M.D.  
F. C. SWEARINGEN, M.D.  
E. N. MCKEE, M.D.

#### Indoor Sports:

R. G. TAYLOR, M.D.  
F. S. BISSELL, M.D.  
O. R. STAFFORD, M.D.

#### Publicity:

HENRY SNURE, M.D.

PAUL F. THURESSON, M.D.  
S. J. ALDEN, M.D.

*Hotels:*

F. W. KIDDER, M.D.  
CLAUDE MAYFIELD, M.D.  
ALBERT ALLEN, M.D.

*Scientific Exhibits:*

LLOYD BRYAN, M.D.  
MONTROSE T. BURROWS, M.D.  
M. J. GEYMAN, M.D.

*Scientific Sessions:*

K. S. DAVIS, M.D.  
C. H. PARKER, M.D.  
H. H. HEYLMUN, M.D.

*Clinics:*

C. B. WITTER, M.D.  
D. M. GHRIST, M.D.  
F. H. FOLKINS, M.D.

*Commercial Exhibits:*

C. W. STEWART, M.D.  
J. F. CHAPMAN, M.D.  
S. V. KIBBY, M.D.

*Agua Caliente:*

LYELL KINNEY, M.D.  
W. E. CHAMBERLAIN, M.D.  
A. E. ELLIOTT, M.D.

*Dinner Night:*

H. J. ULLMANN, M.D.  
JOSEPH D. CONDIT, M.D.  
S. S. MAGAN, M.D.

*Information:*

R. G. KARSHNER, M.D.  
C. C. HOPKIRK, M.D.  
C. C. OWEN, M.D.

*Ladies:*

MILA A. J. KINNEY, M.D.  
MRS. ALBERT SOILAND  
MRS. WILLIAM E. COSTOLOW  
MRS. ORVILLE N. MELAND  
MRS. R. G. TAYLOR  
MRS. O. R. STAFFORD  
MRS. HENRY SNURE  
MRS. K. S. DAVIS  
MRS. C. B. WITTER  
MRS. S. V. KIBBY  
MRS. R. G. KARSHNER  
MRS. C. C. HOPKIRK

## THE SCOPE AND AIM OF THE COMMITTEE ON THE COST OF MEDICAL CARE

At the spring meeting of the Committee on the Cost of Medical Care, in Washington, May 2 and 3, 1930, a special committee of private practitioners was appointed to consider the relation of the Committee to the private practitioners of the country. This Committee, composed of the undersigned members, now submits the following statement for the information of these practitioners on the scope and aim of the Committee's work.

It was clearly recognized by all present at the spring meeting that the Committee has undertaken a program of studies which in its scope goes far beyond that part of the cost of medical care which physicians provide. The expense of several other kinds of service now looms large in the total cost of many illnesses. In addition, special emphasis was given at the meeting to the question of the adequacy of the various services available in a community. Finally, the Committee adopted a statement of three fundamental principles proposed by the Chairman, which should go a long way towards reassuring those who have been apprehensive regarding the nature of the Committee's ultimate recommendations.

### I

The Committee is interested in far more than the physician's bill, which, in many instances, is considerably less than half the total cost of illness. Hospital care, nursing, dentistry, laboratory examinations, and medicines often involve considerable expense, as is clearly shown by several of the Committee's studies which are now being completed or have already been reported upon. In one Middle Western county recently surveyed, the expenditures for various kinds of medicines constituted over one-third of the total expense for medical care,

and were 20 per cent greater than the costs of physicians' services. It is also becoming apparent that a great deal of money is being spent for useless medicines and for various irregular forms of treatment which do the patient no good or which may result in positive harm.

In order to indicate clearly the broad scope of the Committee's work, it was decided at the spring meeting to make a slight change in its name. The word "cost" is to be changed to "costs." The complete name of the Committee, with subtitle, will henceforth be "The Committee on the Costs of Medical Care—Organized to Study the Economic Aspects of the Prevention and the Care of Sickness, Including the Adequacy, Availability, and Compensation of the Persons and Agencies Concerned."

One vital problem before this Committee, declared a prominent physician-member at the recent meeting, is the determination of what is reasonably *adequate care*. In many cases of obscure disorders and serious illness, expensive facilities are essential. Presumably, there must be available in the community well trained general practitioners, certain specialties, dentists, nurses, hospitals, and health agencies—trained and well equipped to do their part in providing all the care that the individual may need. A plan of the Executive Committee, to conduct a study to determine standards of adequate medical care, under the general direction of some well known competent physician and with the assistance of a committee of fifteen or twenty other physicians, was heartily endorsed at the meeting of the general Committee.

The aim of the Committee is to study the problem described by Dr. Olin West, Secretary of the American Medical Association, as the one great outstanding problem before the medical profession to-day. This, he says, is that involved in "the delivery of adequate, scientific medical care to all the people, rich and poor, at a cost which can be

reasonably met by them in their respective stations in life." The Committee is endeavoring to establish a foundation of facts which have an important bearing upon this problem. On the basis of these facts, it will propose recommendations for the provision of adequate and efficient therapeutic and preventive service for all the people at a reasonable cost to the individual, which, at the same time, will provide physicians, dentists, nurses, hospitals and other agents assurance of adequate return. This is not a new statement of aim. Recent discussion, however, has given new emphasis to certain aspects of it. There are important items in the cost of sickness other than the physician's bill; and the adequacy of the service provided must be considered. The program of studies is a comprehensive one. It deals with questions of supply, demand, distribution, and costs of all kinds of services, both preventive and curative; the relation of these costs to other expenses; the return accruing to the practitioners and various agents furnishing medical services, and especially will it seek to determine what standards of adequacy may reasonably be expected.

## II

Dr. Ray Lyman Wilbur, Chairman of the Committee, proposed on the first day of the meeting a statement of three fundamental principles for the consideration of the Committee. This statement was referred to each of four subcommittees which held sessions during the two-day meeting. The entire Committee, at its last session, May 3rd, adopted with a few verbal changes the three principles, which will be of special interest to the physicians and dentists. They follow:

1. *The personal relation between physician and patient must be preserved in any effective system of medical service.*

Medical service is and doubtless by its very nature must remain a distinctly personal service. Even in this age of standardized commodities for the table, ready-to-

wear clothing, and interchangeable spare parts for all types of machines, there has been no plan suggested for the reduction of medical diagnosis and treatment to basic units which can be ordered from travelling salesmen or acquired through correspondence courses. The physician must see his patient—and see him, in many cases, over an extended period of time—if the diagnosis and treatment are to achieve the greatest possible accuracy and efficiency. There is no substitute for personal observation.

Man is not a standardized machine and each individual reacts to the conditions of life in a manner in some respects unique. In the treatment of disease, this individual variation is a factor of great significance and can receive due consideration only when the practitioner has known the patient for a considerable time and maintains a personal relation with the patient.

2. *The concept of medical service of the community should include a systematic and intensive use of preventive measures in private practice and effective support of preventive measures in public health work.*

The cost of adequate curative treatment is now high and may continue to increase as expensive procedures resulting from scientific progress become more widely used. Sickness, in addition, involves other personal and social costs, some of which cannot be measured in monetary terms.

The outstanding achievements in scientific medicine have been made in the preventive rather than the curative field. Knowledge now available for the control of malaria, tuberculosis, smallpox, diphtheria, pellagra, typhoid fever, hookworm disease, and goiter, if effectively applied, would make unnecessary a considerable proportion of the present expense for the cure of sickness.

3. *The medical service of a community should include the necessary facilities for adequate diagnosis and treatment.*

From the standpoint of effective diag-

nosis, many diseases, such as tuberculosis, cannot be recognized promptly in their early stages without the aid of elaborate technical equipment. From the standpoint of adequate therapy, if the best of modern technic is not immediately available, complete cures are either delayed or rendered impossible of attainment. To cite a specific illustration of the improvement of modern therapeutic procedures over those of ten years ago, the time required for treatment of fractures of the hip, and the percentage of permanent invalidity resulting from that injury have each been reduced by more than half.

We cannot be content with anything except the best possible service that modern science can provide, and it is, therefore, imperative that modern scientific equipment for the diagnosis and treatment of disease be available to the practitioners of medicine in every community.

*Special Committee of Private Practitioners:*

STEWART R. ROBERTS, M.D., *Chairman*  
 WALTER P. BOWERS, M.D.  
 A. C. CHRISTIE, M.D.  
 HAVEN EMERSON, M.D.  
 GEORGE E. FOLLANSBEE, M.D.  
 M. L. HARRIS, M.D.  
 J. SHELTON HORSLEY, M.D.  
 KIRBY S. HOWLETT, M.D.  
 ARTHUR C. MORGAN, M.D.  
 HERBERT E. PHILLIPS, D.D.S.  
 C. E. RUDOLPH, D.D.S.  
 RICHARD M. SMITH, M.D.  
 N. B. VAN ETTEN, M.D.

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WESTINGHOUSE FORMS X-RAY  
 COMPANY

Farreaching strides in the development and application of X-ray and electromedical apparatus are foreshadowed by the Westinghouse Electric and Manufacturing Company's announcement that it has entered the X-ray field through a newly organized

\$2,000,000 company known as the Westinghouse X-ray Company, Incorporated.

Two of the largest companies now engaged in the X-ray field, the Wappler Electric Company, of Long Island City, New York, and the American X-ray Corporation, of Chicago, will become identified with this organization.

Under these new arrangements, the new Westinghouse X-ray Company, Inc., will have back of it the resources of the Westinghouse research laboratories, together with its engineering and manufacturing organization, which, it is felt, will go a long way towards the improvement and development of practical apparatus, thus passing on to the medical profession, and through them to the public, the many benefits and advantages of the discoveries made by Westinghouse scientists and research engineers.

The Wappler Company is well known in the medical and hospital world for its Valve Tube Rectifier X-ray Generators, and the so-called "Radio Knife" for bloodless surgery, having been the pioneer in the development of both these types of equipment. Its products and those of the American X-ray Corporation have included a complete line of X-ray accessories and equipment of every type in which electricity is utilized for medical diagnosis and treatment.

The officers of the Westinghouse X-ray Company, Incorporated, are: A. E. Allen, *President*; Calvert Townley, *Vice-president*; Warren H. Jones, *Secretary*, and T. J. Illing, *Treasurer*.

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#### A MEMBER OF THE SOCIETY HONORED

D. A. Rhinehart, A.M., M.D., of Little Rock, Arkansas, a valued member of the Radiological Society of North America, has been chosen by his State Medical Society as President-elect, to succeed E. E. Barlow, M.D., the present President. The

other officers of the Arkansas Medical Society are: William H. Mock, M.D., of Prairie Grove, *First Vice-president*; H. B. Hardy, M.D., of Greenbrier, *Second Vice-president*; J. B. Ellis, M.D., of Helena, *Third Vice-president*; R. J. Calcote, M.D., of Little Rock, *Treasurer*, and William R. Bathurst, M.D., of Little Rock, *Secretary*.

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#### FELLOWSHIP IN ROENTGENOLOGY

The Sealy and Smith Foundation for the John Sealy Hospital, Galveston, Texas, offers a two-year fellowship in X-ray to graduates of Class A medical schools who have served one year's internship in a hospital approved for internships by the American Medical Association.

The work will cover all phases of radiology, under the Director of Roentgenology in the John Sealy Hospital, who is also Adjunct Professor of Roentgenology in the University of Texas.

The Hospital is purchasing at the present time new X-ray equipment for the X-ray Department, which is located in the new Out-patient Building. The equipment consists of complete units for radiology, gastrointestinal work, genito-urinary work, fracture work, together with superficial and deep therapy. It is the largest and most thoroughly equipped department in this part of the South.

During the last twelve months a total of 3,684 examinations have been made in the X-ray Department. The Hospital has 350 beds, 75 per cent of which are devoted to charity. During the past year 5,430 patients have been admitted and 98,028 days of service rendered. There were 40,407 visits to the Out-patient Department.

Due to the amount of available work and the modern equipment in the Department, the fellowship will offer an excellent opportunity for a young man to specialize in

X-ray work and at the same time to do some original work in this line.

The salary will be \$150.00 per month with a \$600.00 bonus at the end of the second year. No maintenance is provided.

Any one interested in this work may direct his inquiry to Lucius R. Wilson, M.D., Superintendent of John Sealy Hospital, Galveston, Texas, or to J. B. Johnson, M.D., Director of Roentgenology, John Sealy Hospital, Galveston, Texas.

### THIRD INTERNATIONAL CONGRESS OF RADIOLOGY

*Paris, July 27 to 31, 1931*

The five United States Delegates to the Third International Congress of Radiology met in Detroit July 23, 1930, for the purpose of discussing ways and means of distributing the limited number of scientific contributions to the Paris Congress.

It was unanimously decided that all applicants should mail data regarding their prospective contributions to the Secretary, Dr. Edwin C. Ernst, Beaumont Medical Bldg., St. Louis, Mo., *not later than the first of October, 1930.*

The scientific program of this Congress will be divided into six sections, as follows:

- (1) Roentgen Diagnosis.
- (2) Roentgen Therapy and Curie-therapy.
- (3) Radio-biology.
- (4) Radiophysics.
- (5) Natural and Artificial Helio-therapy.
- (6) Medical Electrology.

All requests must include the full title of the contribution, name or names of the essayists, together with a brief abstract *not to exceed 400 words.*

The local committee of five will review and make the necessary recommendations to the international committee, but, in addi-

tion, whenever it may be deemed expedient, the opinion of other radiologists and specialists will be invited in helping to pass judgment so that an impartial decision may be reached to the best interests of our representation abroad.

President Antoine Bécélère has informed your committee that each contribution will be limited to fifteen minutes maximum. Furthermore, should the communications submitted by the respective countries be too numerous, that the international committee in Paris reserves the right to limit their number even though the local committee may have accepted such contributions.

### WESTWARD HO!

The Radiological "Family Party" special train from Chicago to Los Angeles promises to be the best we have ever planned. There are already more than seventy registered, with a likelihood of twice that number being on board when the train leaves the station.

Additional entertainment and attractions are offered by Dr. Mills and Dr. Watkins, together with their medical confrères of the Maricopa County, Arizona, Medical Society, and their wives, in Phoenix, where we are to spend the last evening *en route*. These will consist of Indian dances and music, cowboy entertainers, roping exhibitions, and souvenirs of Phoenix and of Arizona such as will cause all of our party long to remember the occasion and make them glad that they came that way.

Members, exhibitors, and all who are interested in or planning to attend the annual meeting of the Radiological Society of North America in Los Angeles next December, are cordially invited to join our "family party" train. Full particulars, itinerary, etc., may be found on page 517 of the May, 1930, issue of RADIOLOGY.

## BOOK REVIEWS

THE CHEST. By L. R. SANTE, M.D., F.A.C.P. Published by Paul B. Hoeber, Inc., 76 Fifth Ave., New York, 1930. Pp. 561. Price \$20.00.

The title designates tersely, but emphatically, that the book is all-inclusive. It is without doubt the best American book ever published on this subject and should be in the hands of all radiologists, clinicians, and those who specialize in diseases of the chest; in fact, it should be adopted as a textbook in our medical schools.

It consists of twenty chapters dealing with the technical aspects, including radiographic and the various special technics such as the production of pneumothorax and the injection of iodized oils, as well as many clinical and diagnostic data.

The book is profusely illustrated, containing two hundred and forty-six cuts of exceedingly good clarity.

ERGEBNISSE DER MEDIZINISCHEN STRAHLENFORSCHUNG (Röntgendiagnostik, Röntgen-, Radium- und Lichttherapie). Herausgegeben von H. HOLFELDER, H. HOLTHUSEN, O. JÜNGLING, H. MARTIUS, H. R. SCHINZ. Band IV. Mit 395 Abbildungen im Text. Verlag von Georg Thieme, Leipzig, 1930. Seiten, 694. Preis, M. 71; gebunden M. 74.

The publisher, Georg Thieme, who has been so active in the field of roentgenology, has again brought out a beautiful book. The fourth volume of the *Ergebnisse* is in our hands. As its three predecessors, it contains again a large number of valuable monographs from the different fields of roentgen diagnosis and radiation therapy.

Two contributions deal with the diagno-

sis of gastric lesions. Max Lüdin, of Basel, considers the change in position and shape of the stomach brought on by extra-gastric causes. His article is well illustrated. Hermann Meyer and Walter Schmidt, of Göttingen, present a very extensive and detailed contribution on the surgical stomach. Their description of the different operative methods, with the roentgen findings, is very instructive.

Still another portion of the book deals with roentgen diagnosis, the roentgenography of the upper urinary tract as a diagnostic means in cases of abdominal tumors. It is written by Karl Scheele, of Essen. The normal pyelogram, with its variations and the influence of tumors and tumor-like processes of the kidney and ureter upon the situation and shape of the pyelogram, is discussed.

Hans R. Schmidt, of Düsseldorf, writes about the histology of carcinoma of the uterus in its relationship to roentgen therapy. Wilhelm Lahm, of Chemnitz, gives us a comprehensive contribution about the basic factors of the biological cures of carcinomas.

Other sections deal with experimental light studies. Alfred Adam, of Danzig, reports about ultra-violet light and Vitamin D studies pertaining to rickets. Philipp Keller, of Freiburg, discusses pigmentation and light protection; Lutz Schall, of Hamburg, the light erythema. Finally, there is quite an extensive contribution from Eberhard Lüdecke, of Dortmund, about diathermy in the therapeutics of ear, nose, and throat diseases. After discussing the physiological basis, the apparatus and methods of medical and surgical diathermy, the special technic is given, with an explanation of the indications and results.

An extensive index is added to the book. Each single chapter has its own special lit-

erature references. The format of the book as to its paper and reproductions is excellent; in all, this volume is equal to its three predecessors in every respect.

F. HAENISCH, M.D., Hamburg, Germany  
*Translation by H. W. Hefke, M.D., Milwaukee, Wisconsin*

EXPERIMENTAL STUDIES ON ROENTGEN TREATMENT OF MALIGNANT TUMORS. By JENS JUUL. Supplement IX to *Acta Radiologica*. Stockholm, Sweden, 1929; 104 pages and 2 plates. Price, \$6.90.

This monograph is a thorough study of the effects of the magnitude and time-relationships of X-ray doses on a carcinoma and sarcoma of the white mouse.

For years radiotherapists have debated over the clinical value of the massive and divided dose and up to the advent of this paper there was little to enable one to decide the relative merits of the two methods. From his evaluation of previous works, supplemented by experiments of his own, Juul thinks that the X-ray dose should be as large as practicable, but that fractional or protracted treatment is preferable, as it allows a larger total dose and better therapeutic effect than may be obtained with the massive dose technics, and that a "saturation method" is preferable to the simple fractional method.

ULTRA-VIOLET RAYS IN THE TREATMENT AND CURE OF DISEASE. By PERCY HALL, M.R.C.S. (Eng.), L.R.C.P. (Lond.). Pages, 248; illustrations, 64. The C. V. Mosby Company, St. Louis, 1930.

The third American edition of this book is introduced by E. C. Ernst, of St. Louis. It deals with the biophysical and clinical as-

pects of ultra-violet therapy, including a brief chapter on infra-red rays. A liberal percentage of illustrations is devoted to the various types of lamps used in therapy; for the benefit of the American reader a group of American-made quartz mercury vapor lamps is added in an appendix. The results obtained by the author in diseases amenable to light therapy are illustrated by case histories, which also offer a brief outline of the technic used with each patient. A very timely chapter discusses "The Ultra-violet Lamps for Use in the Home," a problem of great importance to all physicians. The advice of the author that "the supervision of a medical advisor is therefore indicated, whether the administrator of the home lamp be apparently in good health or otherwise," cannot be emphasized too strongly. A bibliography has been purposely omitted because of the enormous growth of the literature.

E. A. P.

RADIUM AND CANCER. By DUNCAN C. L. FITZWILLIAMS, C.M.G., M.D., Ch.M., F.R.C.S., Senior surgeon and lecturer clinical surgery, St. Mary's Hospital; surgeon, Hospital for Sick Children, Paddington Green, and Mt. Vernon Cancer Research Hospital, Northwood, England. Published by William Wood and Company, 156 Fifth Avenue, New York, 1930. Pages, 172; plates, 8, and illustrations, 64. Price, \$4.50.

As the author states, this book is intended merely as a guide for those whose supply of radium is quite limited (155 to 250 mg.). The use of radium in cancer throughout the organs and tissues of the body is concisely and carefully described. The book is very short but contains many good illustrations and numerous case histories. The author's experience has been rather short and five-year cures are not reported.

Most of the technic has been carried out with radium needles. Superficial therapy is

also described. Distance irradiation is merely alluded to, as the author has had no experience with it. X-ray therapy, in connection with radium, is not described. The author is enthusiastic concerning his work in malignancy of the oral cavity, palate,

tongue, and breast; there is also a good chapter on carcinoma of the rectum. The chapter on uterine malignancies, written by Malcolm Donaldson, describes the technic and results of treatment of cervical cancer in Stockholm, Paris, Brussels, and England.

## ABSTRACTS OF CURRENT LITERATURE

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## APPENDIX (DIAGNOSIS)

**Chronic Appendicitis: Its Diagnosis and Relation to Other Abdominal Diseases.** Joseph B. Larimore. *South. Med. Jour.*, April, 1930, XXIII, 354.

Denial and rejection of the diagnosis of chronic disease of the appendix will not solve the appendix problem. The appendix cannot be rightly overlooked, nor can it be dismissed in a consideration of abdominal symptoms, even when other disease has been discovered. It is the subject of chronic change which may produce a regional or a remote syndrome. It may be intimately or remotely related to other abdominal disease as part of a broad pathological process, and may at rare times require excision as part of the therapy of another disease. Chronic conditions of the appendix are a challenge to diagnosis.

The X-ray shows best the direct signs of appendiceal disease, but these are not proof of a causative relation to the clinical syndrome. In 4,049 complete gastro-intestinal examinations, the appendix was visualized in 34 per cent, and abnormal findings recorded in 17.8 per cent. The X-ray evidence should not be allowed to assume independent responsibility in directing treatment. The abuse of this principle is more often the fault of the physician than of the radiologist.

W. W. WATKINS, M.D.

## ARTHRITIS

**Hypertrophic Osteoarthropathy** (Pierre Marie), or, **Osteoperiostitis Ossificans** (Sternberg). Martin Israelski and Herbert Pollack. *Röntgenpraxis*, April, 1930, II, 342.

Two cases of hypertrophic osteoarthropathy are described, showing very marked skeletal changes. The first case exhibits extensive bone involvement, not hitherto described in the literature. Another unusual feature is the involvement of some of the joints. Hypertrophic changes and periosteal processes vary considerably in degree. A chronic inflammatory

process in the lung, considered by Pierre Marie to be the cause of this disease, was not present in these patients. The etiology is as yet uncertain.

H. W. HEFKE, M.D.

## BLOOD CHANGES

**Researches upon the Biological Action of Radiation on Circulating Blood.** V. Dall'Acqua and T. Zoppellari. *La Radiologia Medica*, January, 1930, XVII, 57.

The authors have radiated circulating blood of rabbits by inserting a "U" tube in the carotid arteries and by protecting the animals from radiation. Coagulation was prevented by using "Novirudin" (of the Pharmaceutische Werke "Norgine," Prague), which does not affect the morphology of the blood. A leukocytic reaction was noted in both control and test groups, but, while in the former normal conditions were reached between the second and fourth day, the latter showed a more persistent hyperleukocytosis, which, after a descending stage, reached points above the post-operative period. A variation of dose from 2,000 to 3,000 r did not cause a distinct difference in the effect produced by X-rays. The authors have found an action of radiation upon circulating blood and explain the hyperleukocytosis as the result of medullary reaction to the products of decomposition or alteration of the blood caused by roentgen rays.

L. MARINELLI.

## CANCER (THERAPY)

**Radium Treatment of Carcinoma of the Breast.** Geoffrey Keynes. *Lancet*, March 1, 1930, CCXVIII, No. 5557, p. 439.

The history of the use of radium in treating carcinoma of the breast is brief, as it is only since 1920 that its application has come to be regarded as anything more than a palliation where operation was not feasible. Radium may be applied externally, spread over a diffracting medium such as the mixture of wax

and sawdust known as "Columbia paste"; it may be used at a distance, using the so-called "bomb," or it may be buried in the tissue in suitable containers. This article deals only with the last of these methods. The first treatment by this method was given by the Surgical Professorial Unit at St. Bartholomew's Hospital under Professor G. E. Gask in 1921, and after three years' experience it became clear that recurrent nodules could be made to disappear by interstitial irradiation. The first treatment given to a patient with primary carcinoma of the breast took place on August 1, 1924. Up to the present time, 154 patients with primary carcinoma of the breast have been treated, and the author believes that no comparable series of radium treatments have been described at any other clinic in the world.

Keynes then reviews the surgery of the breast, with theories of metastatic distribution, and finds that the final results have proved very difficult to assess, as there are so many variable factors, and, therefore, the published figures have differed within wide limits. In his own experience, the results obtained in unselected cases, none being rejected except such as were obviously "inoperable," have not been good. The author believes, from observation of his own patients and those of other surgeons, that frequently the disease is actually disseminated by the operation, as secondary growths appear in the surrounding skin or at a distance more quickly and more widely than if the patient had had no treatment at all. He speaks of the possibility that dissection with the diathermic current might obviate this to a certain extent. The surgical aspect is discussed, partly to outline its principles and partly to suggest that, although there is always likely to be a wide field for pure surgery in breast cancer, it is reasonable to consider whether there may not be a better alternative, namely, radium. He then discusses the technic of the radium treatment, which has been fully described in the *St. Bartholomew's Hospital Reports* for 1927, and in *Acta Radiologica* for 1929 (No. 10, page 393), and emphasizes the necessity of distributing the needles not only beneath the breast itself, but

beneath the muscles, in the axilla, in the costocoracoid membrane, above the clavicle, and in the upper three or four intercostal spaces. Experience has shown that the optimum time for leaving the needles in place is 168 hours, that is, seven days, and he has found it seldom necessary to depart from this standard; also, that it is not only unnecessary but sometimes objectionable to put the needles directly in the growth.

It is interesting to note that the author has found that an acquired resistance to radiation, which has been so much of a bogey in the past, is not of much importance. Patients have received as many as four treatments, and usually the growth has responded as well on the later occasions as on the first, so that a very large growth has been caused to disappear in successive stages.

The author then discusses the diagnosis and warns against biopsy, as he believes it disseminates the tumor, and that in most cases the diagnosis can be made without it. He then summarizes the results. It is important to be able to give the patient some prognosis as to the course of events. Experience has shown that there is always an obvious change in the size of the tumor within two or three weeks, and in two months it may have shrunk to half its original size. Sometimes it has entirely disappeared within three months: if it is very large, it may be six to nine months, and even then a residuum be left, which is stationary. It is found that some of these remaining tumors consist of only a fibrous matrix, and Keynes advises that when this occurs a second radium treatment should be administered, which results in further shrinkage or even disappearance of the tumor. If little change results, the mass should be removed surgically, for even after two treatments carcinomatous cells may have survived due to being screened from the rays by a great thickness of fibrous tissue forming the greater part of the residual tumor.

Several cases are reported, and tables show analysis of the survival rate, giving the results on 109 patients, who have had radium treatment only. The causes of occasional failures are discussed as well as the dangers, such as

puncture of the pleura or internal mammary artery. The fact is emphasized that surgical skill and judgment is needed for radium treatment as much as for any other operation, and that there can be no excuse for applying the treatment without it. The author states he is persuaded that, in the early cases, radium is the treatment of choice. The tumor disappears within a few weeks, the tissues usually become normal, and, so far, in no early case has recurrence taken place. The patient is unimpaired, and may even be able to use the breast for normal lactation. It is likely to be many years before the surgical world at large is ready to subscribe to this opinion.

H. J. ULLMANN, M.D.

**A Preliminary Report of Our Experience with Radiation Therapy of Carcinoma of the Cervix Uteri. O. Nebesky. Med. Klin., May 9, 1930, XXVI, 699.**

One hundred twenty-one cases of carcinoma of the cervix were treated by the combined radium-roentgen therapy. Only seven of these patients were operated on for carcinoma of the cervix, the results being more satisfactory with radiation therapy than with surgery. The primary mortality is avoided, some inoperable cases are saved, and the patients come earlier for treatment, not having to fear the surgical procedure. Charts show the results in percentages.

H. W. HEFKE, M.D.

**THE CHEST (DIAGNOSIS)**

**A Study of Acute Massive Atelectatic Collapse of the Lung. H. G. Jacobaeus. Brit. Jour. Radiol., February, 1930, III, 50.**

The author presents four groups of cases of acute massive collapse of the lung, classified according to the correlated disease. The first group occurred in conjunction with hemoptysis in acute pulmonary tuberculosis, the second was seen in conjunction with or immediately

following acute pneumonia, the third appeared as an independent illness, and the final group occurred in conjunction with lipiodol injection into the bronchi. Attention is called to the fact that in a series of several hundred lipiodol injections into pathologic bronchi, only one case of massive collapse occurred, while in the injection of eight normal cases, three cases of collapse occurred. In contradiction to the time interval of from 4 to 6 hours required for the collapse to occur and its demonstration made possible radiologically, the lipiodol injection cases could be demonstrated from 10 to 15 minutes after injection, and several cases cleared up during roentgenologic observation. The collapse was definitely not related to the amount of lipiodol injected, and in two of the cases the collapsed portions of the lung were not those supplied with air from bronchi containing any of the lipiodol. Likewise, the clearing up of the collapse was not definitely related to the expectoration of lipiodol or mucus. During the period of collapse the lipiodol-filled bronchi were observed to be definitely narrower than following the subsidence of the collapse. The author's assumption, therefore, in these cases of collapse following lipiodol injection, is a generalized spasm in the bronchi, a mechanism which is diminished or lost entirely in cases of diseased bronchi.

J. E. HABBE, M.D.

**Three Cases of Spontaneous Pneumothorax. Kurt Bickhardt. Med. Klin., May 2, 1930, XXVI, 663.**

The etiology of spontaneous pneumothorax is still not clear in many cases. Three such cases are reported, with autopsy findings in two of them. In one it was due to the rupture of an emphysematous bleb in the apex, which apparently was caused by an old tuberculous scar. A bronchial carcinoma led to the rupture of the visceral pleura and pneumothorax in another case. Bronchial asthma has been reported only once as the cause for a pneumothorax. The author adds another case and explains its occurrence by a mark-

edly increased pressure in some alveoli, leading to a localized tear in the pleura and a spontaneous pneumothorax.

H. W. HEFKE, M.D.

**Pleuropulmonary Behavior in Open Pneumothorax: A Simple Demonstration for Physicians and Surgeons.** Howard Lilienthal. *Jour. Am. Med. Assn.*, May 17, 1930, XCIV, 1550.

This essay diagrammatically demonstrates that it is not the lungs which move the chest wall but that the expanding thorax fills the lungs, which in turn collapse when the ribs return to the position of rest. There is a very slight essential pulmonic expansion and even contraction, but this is so insignificant that it does not form an appreciable factor in the function of breathing.

The paper is presented in the hope of popularizing the physics of thoracic conditions and the mechanical principles, illustrated by drawings and diagrams, as they generally are recognized by thoracic surgeons and phthisiologists.

C. G. SUTHERLAND, M.D.

### CONTRAST MEDIA

**The Effect of Injections of Iodized Oil in the Spinal Subarachnoid Space.** Loyal Davis, Hale A. Haven, and Theodore T. Stone. *Jour. Am. Med. Assn.*, March 15, 1930, XCIV, 772.

The authors briefly review the use of iodized oil as a radiodiagnostic method and discuss reaction on the tissues with which it comes in contact. Clinically, it had been generally felt by them that the introduction of iodized oil into the subarachnoid space was not entirely without danger. Experimentally, eight of ten animals injected showed definite clinical indications of the irritative action of the iodized oil. Pathologically, the gross examination of the spinal cords revealed—in all cases but one—a normal appearance except for a fairly well indicated increase in vascular markings in the anterior half of the lower

cervical and upper dorsal regions. Microscopic examination revealed changes in all the cords examined. These were marked leptomeningeal reaction, fat encystment, and degenerative changes in the gray matter.

Their conclusions were that the injection of iodized oil into the subarachnoid space was to be regarded as a dangerous procedure.

C. G. SUTHERLAND, M.D.

**Significance of Radiographic Images Due to Intramuscular Injections of Bi-compounds.** Giuliano Chizzola. *La Radiologia Medica*, February, 1930, XVII, 150.

The author, commenting upon two interesting observations of ossifying myopathy, briefly discusses the origin and the meaning of bismuth shadows. The points stressed are: (1) Contrast between the extension and the significance of radiographic images and the quantity of Bi injected; (2) limited appearance of "retained images" in luetic patients treated with Bi; (3) appearance of myositic processes; (4) the analogy between the images due to Bi and those obtained in cases of myopathy calcificans. The author advances the hypothesis that images observed in patients antisyphilitically treated with Bi are not due to retention of the chemical, but may be ascribed to an interstitial myositis involving the degeneration of the tissues, and of the deposits of Ca salts.

L. MARINELLI.

**Roentgenographic Examination of the Female Pelvic Organs: Use of Opaque Media for Intra-uterine Injections and Formation of Pneumoperitoneum for Gynecologic and Obstetric Diagnosis (Fourth Communication).** Julius Jarcho. *Am. Jour. Surg.*, March, 1930, VIII, 630.

The author gives a brief history of this subject, beginning with the production of pneumoperitoneum, and traces its steps down to the present time.

Recently, the author has combined the production of pneumoperitoneum with the injec-

tion of iodized oil to good advantage in his work. He uses the abdominal route for the introduction of gas when an attempt at its introduction through the uterus has proved the occlusion of the tubes, when there is a bloody or purulent discharge, or when there is a suspicion of carcinoma of the corpus uteri.

By the use of the combined methods, one is able to visualize not only the inside of the uterus, but, also, the exterior and other pelvic viscera. Tumors and other abnormal pelvic conditions can frequently be visualized.

H. P. DOUB, M.D.

### EXPERIMENTAL STUDIES

**The Biological Effect of Rays of Short Wave Length on the Metabolism of the Cell.** Karl Adler. *Strahlentherapie*, 1930, XXXVI, 1.

The metabolism of cells was studied by means of the method developed by Warburg, permitting the exact determination of the amount of oxygen used per milligram of tissue and also the amount of lactic acid produced during certain intervals. The testicle of white rats, at least four months old, was chosen; the results give the amount of oxygen used, of CO<sub>2</sub>, formed when oxygen was present (aërobic) and when oxygen was absent (anaërobic) per milligram of dry tissue and per hour. In the first series, the metabolism of fifteen normal testicles (not irradiated) was studied in order to get normal mean values. In the second series, forty-eight experiments were undertaken with testicles which had been exposed to a dose of 600 r. The time of the determination extended from the first day after irradiation until the forty-sixth day. It appeared that immediately after irradiation, no change of the cell metabolism occurred. This is accepted as proof that the point of attack of radium and roentgen rays cannot be seen in the metabolism of the cell. The first changes are observed twenty-four hours after irradiation and increase with progressing time. The metabolism of the tissue decreases, while both aërob and anaërob glycolysis increases up to double of the normal value. The maximum was observed between the thirty-fourth to the

thirty-sixth day following irradiation. The type of metabolism is very closely related to that of malignant tumors. After the fortieth day, the glycolysis drops below normal values.

Histological studies undertaken at the same time showed the presence of degenerative changes in the cells of the testicle. In the third series (15 experiments), a dose of 2,500 r was given. The observed changes were essentially the same as in the second series, except that they extended over a shorter period. In the fourth series (16 experiments), radium was used in a dose of 2,400 milligram-hours. Again the same changes could be noted, with the exception of slight quantitative differences. In the fifth series (7 experiments), two tests were run side-by-side; in one test, the tissue was kept in Ringer's solution and in the second test, in the serum of the same tissue. There was no difference in the results between these two groups.

The author concludes that his experiments demonstrate how the metabolism of the cell changes following roentgen and radium exposure, approaching the same type of metabolism as malignant tumors. This may explain the appearance of a roentgen or radium carcinoma following many exposures to small doses of either radiant energy over a long period.

ERNST A. POHLE, M.D., PH.D.

### FOREIGN BODIES

**Foreign Bodies in the Duodenum.** F. Oehlecker. *Med. Klin.*, April 17, 1930, XXVI, 583.

The ileocecal region has been considered the place where foreign bodies lodge after they pass through the esophagus and stomach. It has been shown, however, that long foreign bodies may lodge in the duodenum. Two such cases are described by the author. In one case a metal pencil was found in the duodenum, in the other a spoon and a fork. In the latter case, the prongs of the fork had perforated through the wall of the duodenum into the liver. When such a foreign body, especially one with a pointed end, is found in the duode-

num by roentgen examination, one should not postpone the operation too long, as the danger of perforation is always present.

H. W. HEFKE, M.D.

### GASTRO-INTESTINAL TRACT (DIAGNOSIS)

**Perforating Non-specific Ulcer of the Ascending Colon Simulating Appendicitis: Report of Case.** Robert Boyer and Louis Tuft. *Jour. Am. Med. Assn.*, May 17, 1930, XCIV, 1566.

This is a case report in which a patient with the symptoms of acute appendicitis was operated on and a hard indurated mass, three inches above the ileocecal junction and about 7 cm. in length, was felt and resection was done. Histologic study of the specimen showed a simple ulcer of the ascending colon, resembling in its characteristics the ordinary peptic ulcer of the stomach and duodenum.

A review of similar cases in the literature follows, with an interesting comment. In none of the cases was the diagnosis made clinically. The mortality in the reported cases has been 75 per cent. Treatment is essentially surgical and the earlier this is done the better the possible outcome.

C. G. SUTHERLAND, M.D.

**Gastric Disturbances.** A. J. Beams and E. M. Geraghty. *Jour. Am. Med. Assn.*, April 12, 1930, XCIV, 1137.

This is a chapter from a book to be published shortly. Particular menus have been planned, especially for patients whose means are limited and in whose homes there is probably inadequate equipment for preservation and storage of food. The whole has to do with an attempt to function as a real service unit of the out-patient department.

A series of diets are listed which supply enough calories so that the patients may remain at work, and at the same time the foods are such as are tolerated by these patients. There is a wide range of menus suggested. The authors stress the point that each patient is an individual problem and instruction must

be given with regard to food habits, occupation, and economic status. Menus for the rest of the family are included to help solve the housewife's problem of preparing two sets of meals each day.

The whole offers practical assistance in the problem of ambulatory treatment of peptic ulcers.

C. G. SUTHERLAND, M.D.

### GYNECOLOGY AND OBSTETRICS

**The Value of X-ray Studies in Obstetrics and Gynecology.** James R. Reinberger and Phil C. Schreier. *Memphis Med. Jour.*, January, 1930, VII, 10.

Aside from the early diagnosis of pregnancy, the roentgen ray is extremely valuable in the differential diagnosis of obscure abdominal masses from pregnancy. In the diagnosis of presentation and position, where adiposity or excess fluid obscures the findings, the X-ray is most valuable. The work of Thoms in X-ray pelvimetry is discussed, and the technic used at the Memphis General Hospital is described. Briefly, it consists in directing the ray perpendicular to a line drawn from the sacral promontory to the symphysis, with the patient sitting upon the Bucky grid, the measurements being checked with a notched metal strip whose percentage of variation has previously been determined. Even with this information, serial views should be taken in the sagittal plane during labor to show the descent of the head. With this procedure a more satisfactory decision can be arrived at in considering vaginal or abdominal operation.

W. W. WATKINS, M.D.

**A Case of Lithopedion.** P. F. Butler. *Am. Jour. Roentgenol. and Rad. Ther.*, April, 1929, XXI, 365.

A woman 34 years of age had had a tubal ligation three years previously for a ruptured ectopic pregnancy. The fetus was not located and because of the patient's poor general condition the abdomen was closed. At the time of

X-ray study she was having symptoms referable to the gall bladder, but the films showed a small calcified fetus in the right upper abdomen and at subsequent operation the fetus, covered by a thin membrane, was found adherent to the second portion of the duodenum, through which adhesions it had obtained a meager blood supply.

J. E. HABBE, M.D.

**The Value of Radiography in Obstetrics.** H. J. Epstein and A. J. Fleischer. *Med. Jour. and Record*, April 16, 1930, CXXXI, 412.

This article, after an historical review, is devoted chiefly to a discussion of the studies of Warnekros, whose work has thrown new light on the mechanism of labor and has modified much of the text-book teaching on the subject. Radiography in obstetrics substitutes a visual picture, which is more definite and accurate, for the one obtained by palpation, auscultation, etc. Plea is made for a more extensive use of radiography in obstetrics.

W. W. WATKINS, M.D.

#### HEART AND VASCULAR SYSTEM (DIAGNOSIS)

**The Uncoiled Aorta. Part I.—The Normal Aorta.** David S. Dann. *Am. Jour. Roentgenol. and Rad. Ther.*, April, 1930, XXIII, 358.

Study was made of the relation of the ascending aortic arch to the superior vena cava in cadavers by the injection of opaque emulsions of barium sulphate and glycerine, and by air injections into these vessels, in an effort to determine the relation of these structures and their visualization on the X-ray film. This study leads the author to believe that normally the ascending aorta lies medial to the superior vena cava, and, therefore, does not form a part of the supracardiac shadow, except when distinctly widened. The postero-anterior projection not being satisfactory for aortic study, the author has utilized the obliques and finds the left anterior-oblique at 25° the most satis-

factory position. At this angle, transverse and longitudinal measurements are made of the entire arch, the transverse measurement being more accurate and informative. Using a three-foot target-film distance for the oblique view, the author finds 11 to 12 cm. as the upper limit of normal in the hypersthenic type of individual. In aortic disease, an uncoiling of the aorta takes place which is recognized by an increase in the transverse and longitudinal measurements, made in the left anterior oblique position. A table of measurements of normal individuals is given.

J. E. HABBE, M.D.

**A Clinical and Roentgenological Study of the Aorta, with Special Reference to Luetic Aortitis.** Aubrey O. Hampton and T. Duckett Jones. *Am. Jour. Roentgenol. and Rad. Ther.*, April, 1930, XXIII, 390.

Since 1926, heart and aortic studies have been made using a seven-foot tube-screen distance in order to facilitate more accurate tracings and more perfect posing of the patient for the teleoroentgenograms. Prior to that date, roentgenoscopic tracings in the postero-anterior and first or right oblique views were made of each aorta, but since then the second or left oblique position has been considered the more valuable for obtaining accurate information as to the size of the ascending aorta. The normal ascending aorta is, of course, more difficult to visualize than the arteriosclerotic or luetic aorta, but, with the right scapula pulled forward and upward, the clear space of the right lung makes a good background for defining the anterior border of the aorta, and the aortic window defines its posterior border. The two points selected for measuring the width of the ascending aorta are anteriorly at the junction of the right auricle and ascending aorta, and posteriorly at the junction of the ascending aorta with the faintly defined cardiac silhouette.

Wide variations in this measurement have been obtained in both normal and pathologic aortas, with the average normal 4.5 cm., the average arteriosclerotic 5.6 cm., and the av-

erage luetic 7.8 centimeters. The average transverse arch measurement in the arteriosclerotic was 3.5 cm. and in the luetic 4.2 centimeters. These measurements were obtained from twenty-nine luetic cases with aortic dilatation, and seventeen arteriosclerotic cases with no dilatation.

J. E. HABBE, M.D.

### HODGKIN'S DISEASE (DIAGNOSIS)

**Bone Changes in Lymphogranulomatosis.** E. Saupe. *Röntgenpraxis*, May, 1930, II, 397.

Lymphogranulomatosis (Hodgkin's disease) may attack the bones as an osteoporotic process or as an osteosclerotic one, or both forms combined. It is often impossible to distinguish these lesions roentgenologically from carcinomatous metastases. Three cases are described, two with involvement of the vertebræ, and one of the pelvis. If the spine is involved, it is characteristic that the intervertebral discs remain intact, which differentiates it from a tuberculous lesion. Involvement of the skeleton is more frequent than generally thought. Roentgenological examination of the bones in Hodgkin's disease would probably demonstrate such lesions more frequently.

H. W. HEFKE, M.D.

### PROTECTION

**On the Protection of the Eye during Roentgen and Radium Treatment.** Wolfgang Hoffmann. *Strahlentherapie*, 1930, XXXVI, 105.

A number of devices have been suggested in order to protect the eye during irradiation of, for instance, the lids. Ionometric investigations of their protective value so far as roentgen rays are concerned, led the author to the conclusion that about 2 mm. of lead or its equivalent is required for this purpose. He recommends the painting of the lead surface to prevent injuries to the conjunctiva and cornea by rough spots in the metal. For

gamma rays of radium, these devices are of little value. The results of the ionization measurements are represented in tables.

ERNST A. POHLE, M.D., Ph.D.

### RADIUM

**The Association of Radium and X-rays in the Treatment of Malignant Disease.** J. E. A. Lynham. *Brit. Jour. Radiol.*, April, 1930, III, 150.

After an experience dating back to 1911, with the use of radium in malignant disease, the author arrives at the following conclusions: (1) Lasting successes occur when the disease is localized, even though inoperable; (2) in certain cases isolated secondary growths appear even after healing of the primary, some of which also respond to radiation; (3) with generalized disease even local improvement can seldom be achieved; (4) when recurrences developed in individuals who had previously responded well to treatment, but no longer responded, there was usually extension of disease elsewhere in regions unsuspected.

If the primary tumor has been controlled with radium and yet tends to spread by way of the lymphatics, the author recommends prophylactic irradiation with small doses of X-rays over the regional lymphatics and heavier doses only in the presence of definite recurrence.

J. E. HABBE, M.D.

### ROENTGEN THERAPY

**Roentgen Treatment in Bronchial Asthma.** Victor R. Zipperlen. *Strahlentherapie*, 1930, XXXVI, 88.

For the past five years, the X-ray therapy of bronchial asthma has been carried out at the Medical Clinic of the University of Tübingen. Deep therapy radiation over the anterior and posterior region of the lungs in single large or several small fields, was used. The dose per field amounted to one-third E.D. (approximately 200 r); in severe cases, the anterior spleen received the same dose. Even

in old cases, favorable results were obtained. Several tables give detailed statistics showing the relation between the number of treatments given, the age and sex of the patient, and the duration of the disease. Fifteen patients were cured, fifteen improved considerably, fifteen were somewhat improved, and nine did not respond at all. It is concluded that in over 80 per cent, roentgen rays were of benefit in the treatment of bronchial asthma. The author emphasizes that besides irradiation, all other means usually employed in the treatment of this condition are used.

ERNST A. POHLE, M.D., PH.D.

**Treatment by Roentgen Rays in Ovarian Dysfunction.** Frances A. Ford. *Minnesota Med.*, March, 1930, XIII, 186.

This article discusses the use of radiotherapy of low voltage in certain cases of hypofunction of the ovaries; in two previous publications the basis of this treatment has been discussed. Six illustrative cases are cited to demonstrate the possibilities of the treatment. In more than 50 per cent of the cases treated, the results have shown the potential effectiveness of the method. It is suggested that in the development of effective organ extracts, this substitution therapy may obviate the need for radiation treatment in this particular field.

W. W. WATKINS, M.D.

**Contribution to the Roentgen Treatment in Inflammatory Diseases.** Richard Epstein. *Strahlentherapie*, 1930, XXXVI, 170.

The author reports his experience in 161 cases of inflammatory disease of various types. One hundred fifteen cases were favorably influenced, 41 did not respond, and 5 could not be traced.

ERNST A. POHLE, M.D., PH.D.

**Roentgen Therapy of Male Gonorrhea.** Julius Samek. *Strahlentherapie*, 1930, XXXVI, 188.

In gonorrheal prostatitis and arthritis, the author has seen good results following roent-

gen therapy. Deep therapy radiation (150 K.V., 0.5 Zn, 1.0 Al), 20 to 25 per cent E.D. per sitting is used. Follicular infiltrations of the urethra are also benefited by small doses as used in inflammatory conditions. The same has been observed in treating the mucous and sub-mucous infiltrations in the membrane of the urethra during the chronic stage of the disease. Higher doses up to 50 per cent E.D. are required. A latent process may manifest itself following irradiation, and it is possible, therefore, to use small doses of roentgen rays for the purpose of provocation.

ERNST A. POHLE, M.D., PH.D.

**Radiotherapeutic Treatment of a Case of Priapism in Leukemia.** Ira I. Kaplan. *Strahlentherapie*, 1930, XXXVI, 391.

The history of a negro thirty-five years of age is related who had myelogenous leukemia, complicated by painful priapism. An incision in the penis and puncture of the corpora cavernosa, combined with X-ray therapy to the spleen, brought about relief.

ERNST A. POHLE, M.D., PH.D.

**Roentgen Treatment of the Prostate in Cases of Retention.** Viktor Schiller and Walter Altschul. *Strahlentherapie*, 1930, XXXVI, 179.

Roentgen therapy combined with usual conservative methods of treatment favorably influences cases of prostatic hypertrophy even in the presence of retained urine. Five hundred r are given, filtered through 0.5 mm. Cu over two or three fields, one over the symphysis, one over the perineum, and sometimes, one through the sacrum. There is only one contra-indication and that is the suspicion of a malignancy.

ERNST A. POHLE, M.D., PH.D.

**Rare Indications of Roentgen Therapy.** Walter Altschul. *Strahlentherapie*, 1930, XXXVI, 183.

The author reports the histories of one case each of spondylarthritis ankylopoietica, of

periarthritides humeroscapularis, of hemorrhagic diathesis, which responded exceedingly well to roentgen therapy. No further conclusions can be drawn because they represent single observations.

ERNST A. POHLE, M.D., PH.D.

**Radiation Therapy for Inflammatory Diseases of the Brain.** H. Pansdorf and E. Trautmann. *Röntgenpraxis*, May, 1930, II, 393.

Roentgen therapy was tried in six cases of chronic encephalitis, the technic being the same as that commonly used for the treatment of other inflammatory lesions. No improvement or arrest of the disease could be demonstrated. The authors deduce from this that the biological effect of an "anti-inflammatory" dose is dependent not only on the physical factors, but also on the tissue involved. The relatively slight sensitivity of the glia cell, which proliferates in chronic inflammatory brain lesions, may be responsible for the failure of radiation therapy in this disease.

H. W. HEFKE, M.D.

**Success of Roentgen Therapy in a Case of Brain Tumor Followed Up for Two Years.** George Steiner. *Strahlentherapie*, 1930, XXXVI, 193.

The author relates the history of a patient, thirty-three years of age, who had a tumor in the right anterior frontal lobe of the brain. He received several series of X-ray treatments, bringing about considerable improvement. The most striking observation was the almost complete disappearance of choked disks, which were present when starting roentgen treatment (4 D in right eye—5 D in left eye). The patient has been under observation since 1927; his condition is still satisfactory.

ERNST A. POHLE, M.D., PH.D.

#### SINUSES (DIAGNOSIS)

**Lipiodol in Chronic Maxillary Sinus Disease: Study of One Hundred Cases, with Lantern Slides.** W. J. Greenfield. *Jour. Ten-*

*nessee St. Med. Assn.*, February, 1930, XXIII, 55.

Of one hundred patients with chronic maxillary sinus disease, it is most interesting that only twenty-four had as their chief complaint, symptoms referable to the nose or sinus; stomach trouble, cough, backache and general headaches occurred in the larger number. Also of interest is the observation that the nose was normal to examination in 13 per cent of the cases. Lipiodol was used in eighty-nine of these patients, and this method revealed three distinct types of pathology, always confirmed at operation. These are simple hyperplasia, simple polyps, or a combination of the two.

When 76 per cent of patients with chronic maxillary sinus disease will give no nasal symptoms in their chief complaint, and 35 per cent will show no intra-nasal pathology, it becomes necessary to resort to roentgenographic methods, either alone, or supplemented by radiopaque material in the sinuses.

W. W. WATKINS, M.D.

**Further Experience with a New Method for Measuring Intranasal Distance to the Sphenoid Sinus.** Homer Dupuy. *South. Med. Jour.*, March, 1930, XXIII, 193.

The author has previously reported this method in the July, 1927, issue of the *South-ern Medical Journal* on page 536. Further work has been done and the second report is based on 111 subjects. The method consists in securing a "perfect lateral view of the skull," which, according to Granger, is one wherein the outline of the sella is perfect, and the lines of the greater wings of the sphenoid are not more than from 2 to 4 millimeters apart. It is made at a target plate distance of six feet. Thereupon a straight line is drawn from the anterior-superior nasal spine, through the anterior sphenoidal wall to the floor of the sella, and the distances to the anterior sphenoidal wall and to the sella floor are measured. The text-books give from 7 to 8 centimeters as the distance to the sphenoidal wall, whereas, the differences in this distance

may vary as much as 3 centimeters. Knowledge of this distance is necessary for accurate surgical exploration of the sphenoid sinus.

W. W. WATKINS, M.D.

### SINUSES (THERAPY)

**The Incidence of Sinusitis in Asthmatic Children.** Robert Chobot. *Am. Jour. Dis. Child.*, February, 1930, XXXIX, 257.

The author presents the results of a study of sinus infection in one hundred asthmatic children. Roentgenograms are shown before and after treatment. Marked improvement was shown in some cases after surgical drainage. The incidence of sinus infection in asthmatic, as well as in normal, children is higher than hitherto believed. Forty-one per cent of all patients, both sensitive and non-sensitive, had sinus infection as shown by roentgen-ray examination. Treatment should be conservative, but puncture and irrigation should be done when this fails.

F. B. MANDEVILLE, M.D.

### SKIN (GENERAL)

**Observations on the Pigmentation of the Skin.** Alois M. Memmesheimer and R. Matthaei. *Strahlentherapie*, 1930, XXXV, 339.

A tintometer is described, based on Ostwald's color system, which permits the recording of pigmentation and erythema of the skin. Some of the results obtained with this apparatus are described, covering the observation of a skin area over a period of two years.

E. A. POHLE, M.D., Ph.D.

**Experimental Changes of the Sensitivity of the Skin Towards Bucky Rays by Acidosis, or, Alkalotic Changes in the Acid-base-metabolism.** Ferdinand Hoff and Alfred Späth. *Röntgenpraxis*, May, 1930, II, 405.

The authors have shown in a previous paper that the skin sensitivity towards ultraviolet rays can be modified considerably by changing the acid-base-metabolism (as much

as 1:3). The same holds true for the sensitivity of human skin towards Bucky rays. Acidosis increases the sensitivity while alkalosis diminishes it. Acidosis and alkalosis were induced by the authors by a diet and the administration of suitable drugs.

H. W. HEFKE, M.D.

### SKIN (THERAPY)

**Grenz-ray Treatment of Certain Dermatitis.** Emilio Viganò. *La Radiologia Medica*, January, 1930, XVII, 37.

The author publishes the technic followed in forty-three cases of various skin affections. Although this study is not considered significant, the author reports favorable reactions in some cases in spite of their inconsistency and inferiority to those obtained by X-ray treatment. He states that this therapy does not offer any advantage over ordinary roentgen therapy, and that its preferability must rest upon better and quicker effects on skin diseases and not be based upon considerations of safety of treatments.

L. MARINELLI.

**Long Wave X-rays in Dermatology.** Laurence R. Taussig. *Calif. and West. Med.*, March, 1930, XXXII, 166.

Under this title the author discusses the wave named by Bucky as Grenz rays, the apparatus used in the production of these rays, their valuation by Bucky, and the viewpoints of many other users. As personal observation, he reports a number of conditions in the treatment of which he has used this modality which he terms the ultra-soft X-ray. He finds no advantage over short wave X-ray in the treatment of epithelioma. Senile keratoses clears rapidly. Eczema appears to respond similarly to the shorter wave X-ray.

The author concludes that:

1. The Grenz rays described by Bucky are to be considered as X-rays of very long wave length, differing from the rays previously employed in dermatology in quality and quantity rather than in kind.

2. These super-soft X-rays offer another

means for combating skin disease, but will probably not supplant the shorter wave lengths, though further experience may show them to be superior in some particular instances.

3. The unpleasant late sequelæ which occur following over-radiation with short wave lengths do not occur with the doses so far employed. The safety of repeated exposures is questionable and can be proved only by extensive experience.

F. B. SHELDON, M.D.

**The Treatment of Roentgen Ulcers of the Skin.** Edward Bruner. *Strahlentherapie*, 1930, XXXVI, 373.

The histories of eight cases of X-ray ulcer in the skin are related, treated by Finsen light, red rays, ultra-violet light, and application of 1 per cent Rivanol ointment. The results were most gratifying; while phototherapy takes considerable time, it is, undoubtedly, the method which should be resorted to when other therapeutic procedures fail.

ERNST A. POHLE, M.D., PH.D.

**The Sensitizing Effect of the Tar Preparation "Liantral."** Leni Fleischhauer. *Strahlentherapie*, 1930, XXXVI, 144.

The author discovered accidentally that skin which had been painted with "Liantral" became more sensitive to light. A study of this phenomenon revealed the fact that the sensitizing is more pronounced if the light exposure takes place after thorough removal of the preparation from the skin. If the skin had been covered by "Liantral" for fifteen minutes, the sensitivity was already apparent, lasting up to seventy-two hours after its removal. The erythema which appears after from two to three minutes' exposure to the June sun is apparently due to the short visible light and to the long ultra-violet. Other coal tar preparations have a similar effect. It was not possible to isolate a definite substance which is responsible for the observed sensitiza-

tion. Experiments are under way to use the sensitizing effect of "Liantral" in the treatment of eczema and tuberculous skin diseases.

ERNST A. POHLE, M.D., PH.D.

**SPINE (DIAGNOSIS)**

**Spondylolisthesis.** Walter G. Stern. *Ohio St. Med. Jour.*, April, 1930, XXVI, 316.

The frequency of this lesion is in doubt. Three instances of this condition were found during the course of 900 examinations of able-bodied young men who were radiographed before employment by a railroad. On the other hand, not a single instance was found in 941 consecutive cases of back injury handled by the Illinois Industrial Commission. The differential diagnosis requires proper and carefully made X-ray films, and since most excellent, contrasty and detailed X-ray films of this region are possible, they should be insisted upon.

W. W. WATKINS, M.D.

**The Roentgen Picture of Spondylolisthesis.** Herbert Junghanns. *Fortschr. a. d. Geb. d. Röntgenstr.*, February, 1930, XLI, 239.

The term "spondylolisthesis" should be reserved for anterior slipping of a vertebral body, with its upper articular processes, while the lower articular facets and the spinous process remain in normal location. Such slipping may only occur if a defect exists in the interarticular portion; that is, the narrow piece of bone between the upper and lower articular processes.

The pathological department of the Hospital Friedrichstadt at Dresden has in its collection thirty cases of anatomically investigated and determined spondylolisthesis, and some of these specimens are used for illustration of this article.

When adhering to the terminology mentioned, one can readily understand that due to the deficiency in the vertebral arch, mild trauma, for instance, the strains of daily life and of athletic activities, may be sufficient to

produce the actual slipping of the vertebral body. Though the defect in the interarticular portion is filled and bridged by strong ligamentous masses, abnormal motion of the vertebra involved always takes place, which finally leads to anatomic changes in the adjacent structures. A number of illustrations show the defect in the interarticular portion of the vertebral arch and varying degrees of slipping combined with secondary changes of spondylitic nature. It is pointed out that spondylolisthesis must not be confused with a dislocation.

Among thirty cases reported, twenty showed a slipping of the fifth and ten of the fourth lumbar vertebra. Sixteen of the individuals were females. Two cases were observed in the twenty-second and twenty-third year, respectively, while usually spondylolisthesis is a disease of advanced age. The lumbo-sacral angle is usually increased for about ten degrees in cases of spondylolisthesis.

H. A. JARRE, M.D.

**Calcinosis Intervertebralis.** Theodor Bárony and Ernst Koppenstein. *Fortschr. a. d. Geb. d. Röntgenstr.*, February, 1930, **XLI**, 211.

The anatomy, pathology, roentgenology, and clinic of the manifestations of intervertebral calcifications in the lumbar spine, and remarks on chronic deforming spondylitis, together with a number of case reports, is given. Intervertebral calcifications, namely, deposits of lime salts in the intervertebral discs, may occur under pathological conditions which are probably identical with those of the nucleus pulposus, but also, may involve a whole nucleus and the surrounding fibrous ring. Consequently, such central calcifications of the intervertebral discs may show great individual variety with age, segments, extent, and localization. Variations are even augmented by a multitude of roentgenologic projections. In some cases of central calcifications the height of the intervertebral discs was not diminished, and the adjacent vertebral bodies revealed no evidence of pathologic changes. In other

cases perivertebral ridges were associated with normal or reduced intervertebral discs and central disc-calcifications. These central calcifications of the intervertebral discs do not show a characteristic clinical picture as a separate disease entity. They may occur without any clinical symptom and be observed incidentally, but distress is rarely associated with their occurrence. Such distress is of a type usually correlated to chronic deforming spondylitis (backache, lumbago, sciatica, rheumatism, etc.). Therapy of vertebral arthropathy is very disappointing, in spite of prolonged immobilization with or without plaster cast and fusion-operations on the spine.

H. A. JARRE, M.D.

#### SYSTEMIC EFFECTS

**Fertility and Offspring of Former X-ray Technicians.** H. Naujoks. *Strahlentherapie*, 1929, **XXXII**, 613.

The problem of injury to the offspring following irradiation by roentgen rays or radium of the ovaries remains unsolved. After a discussion of the literature from which it appears as certain that treatment during pregnancy is injurious, the author presents the results of a questionnaire which he has sent to a number of former female X-ray technicians. Replies were received from 56 (first group) women, who had married since they left the service, and indirect information on 35 women (second group) was obtained through their employers. Out of this total of 91 women, 22 had been married over a certain period without bearing children. A study of the conditions of the laboratories in which these technicians had worked, particularly regarding protection, suggests that in 12 cases out of the 22 the sterility might be due to exposure. In the first group, 43 women had 86 children, 15 of which were abnormal but only 8 presented striking changes. In the second group, 35 women had 39 children, with one very abnormal child. This would give a total of 9 abnormal children out of 125 reported; however, none of the abnormalities can be considered typical for X-ray injury. Careful analysis reveals five

cases where exposure of the mother may be responsible. This would bring the number of injuries to 4 per cent, but, according to Nürnberg, about the same percentage of abnormalities has been observed in unexposed families. The author refuses, therefore, to draw conclusions based on this material, but simply offers the results of his inquiry for consideration and urges further study.

E. A. POHLE, M.D., Ph.D.

### THROAT (DIAGNOSIS)

**The Clinical Significance of the Roentgen Diagnosis in Diseases of the Larynx.** S. Wulfson and W. Ginsburg. *Röntgenpraxis*, Feb. 15, 1930, II, 158.

Clinical and roentgenological observations on one hundred fifty patients with diseases of the larynx are described. The authors used the technic commonly employed for a lateral roentgenogram of the cervical spine, but with softer rays. Each disease (malignancy, tuberculosis, syphilis, laryngeal scleroma), gives a characteristic roentgen picture, which in most cases agrees with the clinical and histological findings. The changes visible in the roentgenogram are manifested in the changes in the ossification of the laryngeal skeleton. In difficult cases where biopsy and serological examination do not give a definite decision, or in cases where a laryngoscopical examination is impossible, the X-ray examination may be of very important and definite help.

H. W. HEFKE, M.D.

### THYMUS (DIAGNOSIS)

**Cinex-Camera Studies of the Thymus in Infants and Children.** C. K. Halsey and R. Q. DeTomas. *Jour. Mich. St. Med. Soc.*, January, 1930, XXIX, 25.

By means of the Cinex-camera of Jarre, it is possible to make as many as four exposures per second on a roll film, but in the series reported on, the thymus in infants, the average was about five exposures in two seconds. This method of study has shown that the thymus shadow as shown on one, two, or three

X-ray films cannot be taken as indicating true enlargement or hypertrophy. By studying a large series of exposures made on 20 or 30 feet of roll film, great differences in the width of the mediastinal shadow will be shown. The enlarged thymus is not as frequent as supposed, and many instances of supposed thymus enlargement will be found to be physiological changes due to respiratory phases. Conclusions drawn from single films, showing a wide mediastinal shadow before treatment, and a narrow shadow after treatment, may be erroneous, and the difference be represented by respiratory phases, or the difference between the heart in diastole and in systole.

W. W. WATKINS, M.D.

### THYROID (THERAPY)

**Critical Remarks Concerning the Roentgen Treatment of Basedow's Disease.** Wilhelm Rieder. *Strahlentherapie*, 1930, XXXVI, 64.

The discussion of statistics available regarding the X-ray treatment of Basedow's disease is followed by a presentation of the author's own experience. He comes to the conclusion that no explanation of the mechanism of the effect of roentgen rays in Basedow's disease can be offered. In severe cases, except in one single patient, he did not see definite results. In beginning and mild types, roentgen therapy is apparently of value. It is permissible, therefore, to give radiation a trial in beginning and mild cases, in patients upon whom operation would be dangerous, and whenever operation is refused. All other cases should be operated on. In every case where irradiation does not show definite improvement after four months of treatment, operation seems to be indicated. Social indications must also be considered. As preparation for the operation, iodine treatment, as suggested by Plummer, is recommended. The author does not agree with the standpoint of some radiologists that only such patients should be operated on as do not respond to irradiation. In his opinion, the surgical treatment of Basedow's disease is superior to roentgen therapy, both as to duration of treatment and as to permanent results. The

radiation therapy of this disease is also not without danger. In a number of irradiated cases which were operated on later, no histological changes in the thyroid characteristic of roentgen-ray effect could be detected. Photomicrograms illustrate this point. In only one case, certain histological findings pointed to a possible radiation effect; however, similar changes were seen in non-irradiated glands.

ERNST A. POHLE, M.D., PH.D.

**Roentgen Treatment of Basedow's Disease.** Franz Bardachzi. *Strahlentherapie*, 1930, XXXVI, 173.

In severe acute cases, the author begins with 10 per cent E.D., which may be repeated after several days' interval. If there is no reaction, the dose may be increased until within from three to ten weeks, a total dose of one-half E.D. has been reached. In milder cases, one-fourth E.D. to one-third E.D. may be given and be repeated from three to eight days later. A second series should not be applied before six weeks. The larynx must be protected. Two-thirds of an E.D. should never be exceeded in one series. The radiation was produced at 170 K.V., 6 ma., 0.5 mm. Cu, 50 cm. distance. Emphasis is laid upon the statement that severe cases should not be treated as ambulatory patients.

ERNST A. POHLE, M.D., PH.D.

#### TUBERCULOSIS (DIAGNOSIS)

**Acute Subapical versus Insidious Apical Tuberculosis: Pathogenesis and Clinical Significance.** Bruce H. Douglas and Max Pinner. *Am. Rev. Tuberc.*, March, 1930, XXI, 305.

This contribution is enlightening both to the radiologist and clinician and deserves careful study by each.

Acute parenchymal tuberculosis is described as an infiltrative process, and the description of the pathology renders clear to the radiologist's mind the "whys" of the shadows seen

in these cases. The statement is made that tuberculosis begins and advances as a series of acute pneumonias, an infiltrative and exudative process.

The authors draw a distinction between the apical, not usually infiltrative, and the subapical, which is usually a reinfection and exudative. These types differ clinically and in radiological appearance.

The old teaching that acute infiltrative pathology did not occur at the onset of tuberculosis is disproven, and with this view in mind, X-ray shadows in incipient tuberculosis become more understandable.

The authors frankly admit that physical findings are unreliable and agree with Webb that X-ray evidence is the only accurate method of detection. The authors are enlightening, and radiologists doing chest work should study the article carefully.

S. C. BARROW, M.D.

**The Importance of High Doses of Vitamin in Tuberculosis Therapy.** W. Pfannenstiel and B. Scharlau. *Strahlentherapie*, 1929, XXXIV, 650.

The authors studied the therapeutic value of Vitamins B and D on tuberculosis in rabbits. Vitamin D or B alone had no appreciable effect, but both combined led to a definite improvement in the condition of the diseased animals as compared with the untreated controls. The possibility of treating babies with Vitamins B and D, by feeding yeast and irradiated ergosterol, is discussed.

E. A. POHLE, M.D., PH.D.

**Peribronchial Tuberculosis.** Piero Zorzoli. *La Radiologia Medica*, February, 1930, XVII, 166.

The author, reviewing the controversy on the interpretation of pulmonary bands, as either indicative of initial tuberculosis or simply the existence of pulmonary vessels, states that they may indicate both. The vascular shadows present a peculiar appearance that

may be identified with the aid of radiographic anatomy, while the information given by pathological anatomy and clinical radiological observation enables the radiologist to derive from a radiographic image the signs of specific affections located in the bronchial walls or in their periphery. A complete interpretation and discussion of nine radiographs is given by the author, who finally points out that peribronchial bands may reveal not only an initial infiltration, but also the advanced and, sometimes, ultimate stage of pulmonary tuberculosis.

L. MARINELLI.

**Tuberculosis in School Children: Some Diagnostic Points.** E. W. Hayes. Calif. and West. Med., March, 1930, XXXII, 178.

The author gives some of the history relating to tuberculosis and its diagnosis in children. He bases a good deal of his paper upon the work of Opie and McPhedran, who for the past seven years have been carrying on research work in connection with the University of Pennsylvania. They have found in their work that, with very few exceptions, the only definite evidence of tuberculosis of the tracheobronchial glands is the presence of calcium deposits as revealed by X-ray.

Further, Opie and McPhedran feel, from their findings, that the so-called peribronchial thickening of the trunks and the apparent beading, which has more or less universally been given a pathological significance as an indication of the extension of the disease from the hilum region, should not be considered as such, either in children or in adults. In a large series of specimens studied they found no pathological basis for the inference that this thickening is due either to a tuberculous or non-specific respiratory infection. By the use of exposures synchronized to the heart beat, they concluded that the apparent thickening of the trunks was due to movement set up in the accompanying artery by systole, and that the apparent beading was caused by branches coming off from the arteries at angles. We are not justified, then, in diagnosing tuberculosis by X-ray findings, without

definite signs in the parenchyma or calcium in the glands.

Again, according to these authorities, another common diagnostic error which leads to false conclusions as to the pathogenesis of tuberculosis, is the finding of apparent calcium deposits in almost all X-ray films of chests, particularly along the bronchi, where they branch, and in the region of the hilum. These shadows have been found to be due, in most instances, to vessels which are axial, or nearly so, to the incident or primary ray. In such cases the shadows of columns of blood of various lengths are cast on the films. They appear as dense areas, more or less clear and regular in outline. Such shadows may occur anywhere in the lung tissue, except at the apex and in the extreme lateral margin. They are larger and more numerous in the hilum region, where the vessels are larger and more numerous. Shifting the plane of the X-ray tube will cause these shadows to disappear, or reveal their true nature.

A calcified lymph node, on the other hand, may change its contour when the plane of the tube is shifted, but it will continue to be recorded as a shadow of consistent quality, finely and irregularly granular, or made up of softly lamellated or crenated lines, or irregularly stippled.

The practical significance of these conclusions is that, in the absence of characteristic physical findings or clinical symptoms of tuberculosis in the chests of children, the evidence of a positive diagnosis rests upon a history of household exposure, sensitiveness to the tuberculin test, and X-ray evidence of parenchymatous involvement.

F. B. SHELDON, M.D.

**A Study of Intestinal Tuberculosis among Ex-service Men.** Philip B. Matz. Am. Jour. Med. Sci., April, 1930, CLXXIX, 532.

Erickson is quoted to the effect that the frequency of the occurrence of intestinal tuberculosis, as a complication of the pulmonary form, is quite out of proportion to the frequency of its diagnosis. Failure to recognize

this complication reflects the inadequacy of our present diagnostic methods, and the necessity and value of the roentgenologic technic of Brown and Sampson. In 200 autopsies on patients dying from pulmonary tuberculosis, 60.5 per cent showed intestinal involvement. In a comparison of the values of different methods of examination, it was found that the combination of clinical and X-ray methods discovered the largest percentage of cases. The most frequent roentgen signs characteristic of intestinal tuberculosis in the order named, were: Filling defects in the cecum and ascending colon; irregularity of outline of the cecum and loss of haustral segmentation of the ascending colon; hypermotility at six hours; hypermotility at twenty-four hours; filling defects in portions of the large intestine other than the cecum and ascending colon; ileal stasis; roentgen changes noted by enema, and fixation of cecum.

W. W. WATKINS, M.D.

**Tuberculosis in Nurses: A Study of the Disease in Sixty Nurses Admitted to the Manitoba Sanatorium. E. L. Ross. Can. Med. Assn. Jour., March, 1930, XXII, 347.**

This paper is the Canadian Tuberculosis Association prize essay for 1929. It is based on a study of tuberculosis in 60 nurses, or nurses in training, admitted to, or examined at, the Manitoba Tuberculosis Sanatorium at Ninette, of which Dr. Ross is the Assistant Superintendent.

The incidence of tuberculosis among nurses appears to be greater than among women in other professions. There are usually as many nurses in the Sanatorium under treatment at any one time as school teachers, stenographers, and university women taken together. Of this series of 60, 40 broke down before graduation and 20 after graduation (10 during the first year after graduation).

Of the 800 nurses trained and graduated in the Province of Manitoba over a four years' period, 6 per cent became sanatorium patients directly from their training schools, or within a year after leaving them. Compared with

this only ten of the 4,000 graduate nurses in the Province have been patients in the Sanatorium, an incidence of one-third of 1 per cent. All this goes to show that tuberculosis is much more common among nurses in hospitals than nurses out of hospitals, more common among young than older graduates, and more common among nurses than women in general.

Included in the conditions which predispose to tuberculosis among nurses in hospitals are the early age of admission, and the previous freedom from contact with disease, especially of the tuberculous type. A contributing factor is the presence of unrecognized tuberculous disease in patients in hospitals being treated for other diseases.

Suggestions for improvement grow out of a consideration of these faults in the nurse's hospital routine. The age period of admission for training should be raised to 21 years. The hours of "energy expenditure" should be carefully investigated. Nurses on entering training should have a complete physical examination, and X-ray plates of the chest. All hospital patients should have a thorough history taken, and a complete physical examination made. Nurses should receive definite and ample teaching about tuberculosis and the routine for tuberculous patients.

L. J. CARTER, M.D.

**TUBERCULOSIS (THERAPY)**

**Phrenic Exaeresis in the Treatment of Pulmonary Tuberculosis. L. Wallace Frank and O. O. Miller. Ann. Surg., May, 1930, XCI, 669.**

The authors review briefly the history, indications, and operative technic of phrenic exaeresis. Since August, 1926, they have had 125 cases of phrenic exaeresis. They review 100 cases, 39 of which were males and 61 females, and conclude that phrenicectomy is a valuable aid in the treatment of pulmonary tuberculosis in selected cases. Ninety per cent of the 100 cases were far advanced, 40 per cent showed improvement, and in 8 the

sputum became negative for tubercle bacilli, while in 8 the cavities disappeared.

In every case with cavitation, phrenicectomy as an adjuvant to artificial pneumothorax should be considered. Forty-four per cent of the series showed a better collapse following avulsion of the phrenic nerve. Phrenicotomy is not considered a substitute for pneumothorax, but, when done as a preliminary procedure in a small percentage of cases, it will render collapse therapy unnecessary.

The good results of phrenicotomy are thought to be dependent on the retractability of the pulmonary tissue, and not on the location of the pathologic change. Basal and mid-lobe lesions offer most, and cavities above the clavicle least, although even the latter show good results when marked elevation of the diaphragm is obtained.

In summary, the authors state that a good phrenicotomy is better than a poor pneumothorax. It is less hazardous, less discomforting, unattended by complications, and a necessary preliminary to thoracoplasty. A number of roentgenograms are shown which demonstrate closure of cavities in the lung.

F. B. MANDEVILLE, M.D.

### TUMORS (DIAGNOSIS)

**Differential Diagnosis and Treatment of Solid Tumors of the Testicle, with Reference Especially to Teratoma.** Thomas C. Stellwagen, Jr. *Pennsylvania Med. Jour.*, April, 1930, XXXIII, 458.

Growths involving the scrotal contents are commonly seen, though malignant tumors are comparatively rare. Ewing believes that practically all tumors of the testis arise from teratomatous structure, though one cellular element may predominate and produce a tumor resembling one of the tissue growths, which accounts for the confusion in classifying them. Mixed or teratomatous tumors of the testis are usually unilateral, and the treatment is essentially surgical when the growth has not progressed to the inoperable stage. The author believes in X-radiation both before and

after operation, and states that it will be his rule in the future to have every case of teratoma of the testicle given a preliminary deep X-radiation before operation, and, after operation, when healing is complete, to have post-operative radiation, as has been the practice in the past.

W. W. WATKINS, M.D.

### TUMORS (THERAPY)

**Recurrent and So-called Metastatic Giant-cell Tumor.** Charles F. Geschickter and Murray M. Copeland. *Arch. Surg.*, May, 1930, XX, 713.

The authors have studied 222 cases of giant-cell tumor, with special reference to recurrence after treatment, and also the so-called metastatic giant-cell tumor.

Twenty-six cases of recurrent tumor after primary curettement were studied. The recurrences in this group do not depend on the histological structure, but on a poor selection of the type of treatment applied in the individual case or on an incomplete operation. Advanced destruction of the bone shell, incomplete curettement, failure to use thermal or chemical cauterization, or needless sacrifice of cortical bone at the operation, as well as an age over 35, were found to be factors predisposing to recurrence after curettement.

In seven cases showing a microscopic resemblance to malignancy, the histologic change was usually found to be the result and not the cause of the recurrence, being dependent on intervening infection, necrosis, or an accentuated healing reaction following irradiation.

Recently, there has been an attempt to show that the typical giant-cell tumor, called benign, may occasionally metastasize and produce death. In eight such cases which the authors have collected from the literature and from their series, they found no metastatic nodules composed of typical giant-cell tumor cells, and in no case was the original tumor the true benign giant-cell structure found associated with death from metastases.

Various methods of treatment are discussed.

Amputation was performed in 30 cases with no recurrences, no operative deaths, and no deaths from tumor. Resection was performed in 34 cases. There were no deaths from the operation or tumor, and only one recurrence. In 105 cases, curettement was the method of treatment, with recurrence in 31 cases. Roentgen therapy was employed in five cases. Three cases only have been followed and found to be living, less than five years.

HOWARD P. DOUB, M.D.

**Favorable X-ray Treatment of Pulmonary Metastasis of a Testicular Tumor Previously Irradiated.** Dino Mantovani. *Atti del Raduno Radiologi Alta Italia, October, 1928, VI, 87.*

The author relates a case of metastasis of the lung, discovered two years after the successful treatment of a tumor of the testis, which had disappeared after deep X-ray therapy.

L. MARINELLI.

### ULTRA-VIOLET LIGHT

**The Treatment of Local Affections, Particularly of the Mouth and Pharynx, with Artificial Sunlight.** Hans Henseler. *Strahlentherapie, 1930, XXXVI, 323.*

This is a description of an incandescent lamp the bulb of which transmits the ultra-violet rays emitted by tungsten. A special applicator with mirror attached to the lamp makes it suitable for treating lesions in the mouth and throat.

ERNST A. POHLE, M.D., PH.D.

**The Problem of Protection against and Adaptation to Light.** G. Miescher. *Strahlentherapie, 1930, XXXV, 403.*

In this article, the author presents the results of his investigations concerning the biology of light. The six chapters of the paper deal with the protective action of the horny layer of the skin exposed to ultra-violet rays of short wave length, with the

histology of the skin reaction, the adaptation to light exposure, the cause of absorption of the light in the horny layer, the rôle of the pigment, and influence of light on the albumin solutions. He found that the ultra-violet rays (Dorno rays), which produce the erythema of the skin, are absorbed by the horny layer in proportion to its thickness. This follows principally the law of absorption for a homogeneous radiation with the half value layer of  $9\mu$ . The difference in light sensitivity of the various parts of the body surface can be explained by the difference in the thickness of the horny layer. The latter is in all probability the determining factor for the susceptibility to light. The histological study of light reactions (quartz mercury vapor lamp) showed a progressing depth effect with increasing dose; no difference in susceptibility among the various cell elements could be found. Again, it appeared that the thickness of the horny layer is the decisive factor for the depth effect and also for the amount of reaction. The same dose produced different effects, depending entirely upon the thickness of the horny layer.

The reparative process following each light reaction takes place always as a hypercompensation, both as to proliferation (acanthosis), and hornification (keratosis). The ultimate result corresponds, therefore, to a thickening of the horny layer, resulting in a decreased susceptibility to light. It seems that the adaptation to light is a direct consequence to an increase in the horny layer formation.

The mechanism of the protection afforded by the horny layer is due to dispersion, reflection, and absorption. According to the experiments conducted so far, the absorption is the most important factor. Among the absorbing substances, tyrosin takes first place. Cystin, which is found up to 11.6 per cent in the human horny substance, absorbs about one-tenth as much of the light as quinine. Cholesterol does not show any absorption in this short ultra-violet region. The pigment absorbs Dorno rays very well. Synthetic melanin (dopamelanin) absorbs in the same manner as quinine. However, because of the considerable depth in which pigment is found,

it protects only the papillary layer in cases of excessive light exposure.

Hausmann and Spiegel-Adolf have shown that the erythema effect of ultra-violet rays after passing through an alkaline serum-albumin solution, was definitely decreased if the solution had been irradiated before. The author repeated these experiments with a keratin solution and could confirm these findings. The histological part of the article is well illustrated with good photomicrograms.

E. A. POHLE, M.D., PH.D.

**The Mechanism of the Action of Ultra-violet Rays.** Michele Cataldi. *La Radiologia Medica*, March, 1930, XVII, 262.

The author reviews the present controversy on the subject, with special reference to the supposed beneficial action of air ionized by ultra-violet light. He refers to fourteen cases of rickets successfully treated with heliotherapy, in which care was taken to prevent the patients from inhaling ionized air. Results led to the belief that ultra-violet rays exert their action through the skin. The hypothesis is advanced that this radiant energy is transmitted from one cellular layer to the next. In so doing it undergoes physical changes and brings about modifications in the structure of the cells, as well as influencing the biochemical processes which regulate their life.

L. MARINELLI.

**Studies of the Ultra-violet Emission and the Erythema Effect of the Osram-Vitalux Lamp in Relation to Its Age.** E. Spiller and A. Rüttenauer. *Strahlentherapie*, 1930, XXXVI, 136.

Spectrophotometric studies showed that the ultra-violet emission of the Osram-Vitalux lamp after 300 burning hours decreases about 15 to 25 per cent between 2,890 and 3,130 Ångströms. The permeability of the glass of the bulb remains practically unchanged. Investigations of the erythema of the skin proved that the Osram-Vitalux lamp in the special

reflector after 150 and 300 burning hours, at 100 cm. distance, produces a reddening after from forty to sixty minutes' exposure. While the degree of the erythema obtained from the new lamp and the lamp after 150 burning hours is practically the same, there is less reddening of the skin following exposure to the lamp after 300 burning hours.

ERNST A. POHLE, M.D., PH.D.

**Blastomycosis with Pulmonary Involvement and Recovery.** F. J. Altschul. *Jour. Med. Soc. New Jersey*, February, 1930, XXVII, 132.

In the case cited, on the roentgenogram the pulmonary involvement greatly resembled tuberculosis, which was ruled out by absence of acid-fast bacilli and presence of blastomyces in the sputum. There was a lesion on the back of one hand, also showing blastomyces. The hand lesion was treated by X-ray and the lung lesion by ultra-violet radiation. A high calory diet and iodides was the general treatment. The lung lesion cleared up entirely in twelve weeks, and the hand lesion healed under X-ray treatment.

W. W. WATKINS, M.D.

**The Effect of Ultra-violet Light Treatment on Young Children.** Ethel Cassie and Ursula Cox. *Lancet*, April 19, 1930, CCXVIII, 878.

The recent observations on the therapeutic use of ultra-violet light have made the doubters more doubtful, but have failed to lessen the enthusiasm of the advocates. The principal difficulty is the insufficiency of objective data. Those using the lamps and watching effects on their patients are almost always convinced that rapid beneficial results are obtained, but these impressions are of little value except as personal convictions. The difficulties of obtaining objective data are evident in the investigation reported, but certain definite facts undoubtedly emerge. The work was done in the Birmingham Child Welfare Light Clinics,

of which there are nine in that city. These Clinics treat children under five years of age, and during 1928, 1,375 children attended the Clinics, with 16,481 visits. Careful inspection of the records showed that only 346 were sufficiently complete for detailed study, and complete description is given in the article of the procedure for admission to the Clinics and the requirements.

The dose used ordinarily is a fourth of the erythema dose, calculated on the average adult. This is checked by giving an erythema test to each child, any undue sensitiveness indicating a reduction of the dose. Treatment is given twice weekly, and the dose is not progressively increased, since the mercury vapor lamp is used, and there is no pigmentation. The child attends for six, eight, or twelve treatments, and is then seen again by the medical officer. The 346 records were selected because of regular attendance at the Clinic, a weight record at the beginning and end of treatment, and no intercurrent event which made the evaluation of the result difficult, such as intercurrent illness, hospital treatment, or country holiday.

The conditions are classified broadly as: (1) *General debility*. This group comprises children of poor physique, unusually underweight and not gaining, flabby and anemic, and of subnormal vitality, but does not include children suffering from any definite catarrhal condition. (2) *Catarrhal cases*. These include children suffering from or excessively liable to conditions such as rhinitis, tonsillitis, bronchitis, and otorrhea, most of which suffer also from general debility. (3) *Rickets*. Only those cases are included under *rickets* in which the condition is shown by X-ray examination of the wrist bones. (4) *Malnutrition*. (5) *Debility due to mismanagement*. This group includes children who may be summed up as "spoilt children," and whose physical health has suffered. (6) *Amyotonia*. This group includes children who have nothing much wrong with them, but who are lethargic and flabby, and are frequently overweight. (7) *Nervous excitability*. This group includes nervous children who are overactive and excitable, thin, not gaining weight, and frequent-

ly suffering from sleeplessness, night terrors, and anorexia.

The simplest objective data of progress lay in the observation of the weight record during treatment. The cases were placed in age-groups, and the average gain in weight ascertained as compared with the average for the normal child. Tables are given for all the different conditions, the classification effect on weight, etc. The percentage of gain in weight as compared with a normal child in the different age-groups are: under one year 113.8 per cent; one to two years 123.5 per cent; two to three years 125.7 per cent, and from three to four years 157.1 per cent. This shows a higher average gain in each age-group than is made by the normal child. Classification of children is also made on the types of homes as good, fair, poor, and very poor.

The effect on the general health in 271 cases where the records were sufficiently complete to make it possible to estimate the degree of improvement obtained in general health, was very good, considering the severity of the classification. Eighty-three per cent improved, and no less than 37 per cent showed marked improvement, while 6 per cent showed striking improvement. In each group there was a definite improvement in over 80 per cent of the cases, except in the mismanaged group, where it is a question of affecting the mother rather than the child.

The catarrhal cases included some with enlarged tonsils and adenoids awaiting operation, and the improvement in health obtained by light treatment during this period is of definite value, though it would be preferable to avoid the delay of the average of three months necessary in this Clinic in most cases. The malnutrition cases received a certain amount of advice in addition to light treatment, but these, as well as the majority of other cases, had already been under the care of the child welfare centers for some time, and were sent in because they had failed to improve. The rickets cases are classified not in relation to rickets, but in relation to general health. The rickets, of course, healed in every case, but in very poor homes the general health did not improve concurrently, and in two cases there

was no improvement. The total number treated during the year was 293, and the small number of cases, 32, included in the report is due to the incomplete records in this group. The results obtained, however, are better than with cod-liver oil in home treatment, because the mothers bring their children for treatment, but will not trouble to give the oil at home. Four symptoms were studied: anorexia, sleeplessness, nervous excitability (such as fretfulness and bad temper), and lack of muscle tone. The result obtained was usually good, although 18 to 34 per cent of cases in which there was failure to obtain improvement are noted. It must be remembered, however, that the mismanaged group is included, and without change of environment these are little affected.

The conclusions are that light treatment on city children gives definitely encouraging results. The curative effect on rickets is an established fact: whether it is of real value in other directions remains to be proved. On young children, at the period of life when light deprivation is most common in cities, it appears to act as a definite stimulant to metabolism. The effect on nervous symptoms is particularly interesting and very well marked. The authors suggest that it might be possible to suppose that a more effective elimination of fatigue toxins is secured. The effect on weight is striking. The height records were not sufficiently accurate to be quoted, but it is probable that the increase in weight is associated with increased growth.

H. J. ULLMANN, M.D.

**Contribution to Chronic Lesions of X-rays.** Paolo Jacotti. *Atti del Raduno Radiologi Alta Italia*, October, 1928, VI, 63.

The author illustrates, chronologically, the stages of a severe case of an X-ray lesion successfully treated by diathermic coagulation. After a general review of the literature on the

subject, he concludes that surgery is not to be resorted to, but that physical means, such as ultra-violet and infra-red rays, offer a good chance of cure. He advises, also, early treatment of the lesions and emphasizes the effectiveness of diathermic coagulation in this case, which involved the whole left hand and presented neoplastic degeneration.

L. MARINELLI.

**On the Choice of a Measuring Unit for Ultra-violet Rays.** J. Saidman. *Strahlentherapie*, 1930, XXXVI, 299.

The author describes some of his studies dealing with the establishment of a dose unit for ultra-violet rays. They are related in detail in his book, "Measurements of the Sensitivity of the Skin" (in French), published by Dion, Paris. He suggests the appointment of an International Committee in order to reach agreement concerning an international unit for measuring ultra-violet light.

ERNST A. POHLE, M.D., Ph.D.

#### X-RAY APPARATUS

**Automatic Stabilizer of Filament Current in Coolidge Tubes.** E. Pugno Vanoni. *Atti del Raduno Radiologi Alta Italia*, October, 1928, VI, 229.

Without giving a detailed description of the apparatus, the author explains the principle of a rather simple electromagnetic device, which can keep the filament current of a tube at a constant value in spite of variations of potential in the line. Experimental data show that variation in potential of the order 6.75 per cent causes a change of 2.4 per cent in the filament current as compared to 79 per cent in an ordinary tube. He finally points out the possibility of extending such a principle to the entire X-ray unit in order to obtain stabilization of the voltage applied to the tube.

L. MARINELLI.

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